

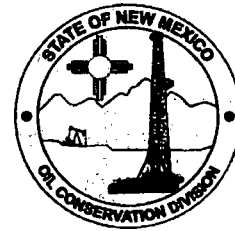
State of New Mexico
Energy, Minerals and Natural Resources Department

Susana Martinez
Governor

Ken McQueen
Cabinet Secretary

Matthias Sayer
Deputy Cabinet Secretary

Heather Riley, Division Director
Oil Conservation Division



New Mexico Oil Conservation Division approval and conditions listed below are made in accordance with OCD Rule 19.15.7.11 and are in addition to the actions approved by BLM on the following 3160-5 form.

Operator Signature Date: Original APD 5/15/2015 Sundry Date 5/10/2018

API WELL #	Well Name	Well #	Operator Name	Type	Stat	County	Surf. Owner	UL	Sec	Twp	N/S	Rng	W/E
30-045-35687-00-00	HEROS 2308 09L	002H	LOGOS OPERATING, LLC	O	N	San Juan	F	L	9	23	N	8	W

Conditions of Approval:

(See the below checked and handwritten conditions)

- ✓ Notify Aztec OCD 24hrs prior to casing & cement. Run CBL if cement does not circulate
- ✓ Hold C-104 for directional survey & "As Drilled" Plat
- ✓ Hold C-104 for NSL, NSP, DHC,
- Spacing rule violation. Operator must follow up with change of status notification on other well to be shut in or abandoned
- ✓ Regarding the use of a pit, closed loop system or below grade tank, the operator must comply with the following as applicable:
 - ✓ A pit requires a complete C-144 be submitted and approved prior to the construction or use of the pit, pursuant to 19.15.17.8.A
 - ✓ A closed loop system requires notification prior to use, pursuant to 19.15.17.9.A
 - ✓ A below grade tank requires a registration be filed prior to the construction or use of the below grade tank, pursuant to 19.15.17.8.C
- ✓ Once the well is spud, to prevent ground water contamination through whole or partial conduits from the surface, the operator shall drill without interruption through the fresh water zone or zones and shall immediately set in cement the water protection string
- ✓ Submit Gas Capture Plan form prior to spudding or initiating recompletions operations.
- ✓ Regarding Hydraulic Fracturing, review EPA Underground Injection Control Guidance 84
- ✓ Oil base muds are not to be used until fresh water zones are cased and cemented providing isolation from the oil or diesel. This includes synthetic oils. Oil based mud, drilling fluids and solids must be contained in a steel closed loop system.

May 15, 2018

Page 2

- ✓ Well-bore communication is regulated under 19.15.29 NMAC. This requires well-bore Communication to be reported in accordance with 19.15.29.8.
- ✓ Comply with current regulations at time of spud
Prior to production operator needs to be in compliance with RULE 19.15.5.9
- ✓ Notify Aztec OCD 24hrs prior to casing & cement.
- ✓ Notify the OCD Engineering Bureau of the change in setbacks to see if an amended NSL will be necessary prior to C-104 approval.
- ✓ Adhere to any other previously issued conditions.



NMOCD Approved by Signature

5/14/18

Date

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

RECEIVED

MAY 10 2018

FORM APPROVED
OMB No. 1004-0137
Expires: January 31, 2018

SUNDRY NOTICES AND REPORTS ON WELLS
Do not use this form for proposals to drill or to re-enter an abandoned well. Use Form 3160-3 (APD) for such proposals.

5. Lease Serial No. NMNM18463

6. If Indian, Allottee or Tribe Name

7. If Unit of CA/Agreement, Name and/or No.

8. Well Name and No. Heros 2308 09L 2H

9. API Well No. 30-045-35687

10. Field and Pool or Exploratory Area
Nageezi Gallup

11. Country or Parish, State
San Juan County, NM

SUBMIT IN TRIPLICATE - Other instructions on page 2

1. Type of Well

☒ Oil Well ☐ Gas Well ☐ Other

2. Name of Operator LOGOS Operating, LLC

3a. Address 2010 Afton Place
Farmington, NM 87401

3b. Phone No. (include area code)
(505) 324-4145

4. Location of Well (Footage, Sec., T., R., M., or Survey Description)
1476 FSL & 240 FWL, NW/SW, L Sec 9 T23N R08W

12. CHECK THE APPROPRIATE BOX(ES) TO INDICATE NATURE OF NOTICE, REPORT OR OTHER DATA

TYPE OF SUBMISSION	TYPE OF ACTION			
☒ Notice of Intent	☐ Acidize	☐ Deepen	☐ Production (Start/Resume)	☐ Water Shut-Off
☐ Subsequent Report	☐ Alter Casing	☐ Hydraulic Fracturing	☐ Reclamation	☐ Well Integrity
☐ Final Abandonment Notice	☐ Casing Repair	☐ New Construction	☐ Recomplete	☐ Other
	☒ Change Plans	☐ Plug and Abandon	☐ Temporarily Abandon	
	☐ Convert to Injection	☐ Plug Back	☐ Water Disposal	

13. Describe Proposed or Completed Operation: Clearly state all pertinent details, including estimated starting date of any proposed work and approximate duration thereof. If the proposal is to deepen directionally or recompleat horizontally, give subsurface locations and measured and true vertical depths of all pertinent markers and zones. Attach the Bond under which the work will be performed or provide the Bond No. on file with BLM/BIA. Required subsequent reports must be filed within 30 days following completion of the involved operations. If the operation results in a multiple completion or recompleat in a new interval, a Form 3160-4 must be filed once testing has been completed. Final Abandonment Notices must be filed only after all requirements, including reclamation, have been completed and the operator has determined that the site is ready for final inspection.)

LOGOS Operating LLC, request a change in plans to the Point of Entry (POE), Bottom-hole Location (BHL) and Total Depth (TD), per the attached C102 Plat, the Drilling and Directional Drill Plan.

BLM'S APPROVAL OR ACCEPTANCE OF THIS ACTION DOES NOT RELIEVE THE LESSEE AND OPERATOR FROM OBTAINING ANY OTHER AUTHORIZATION REQUIRED FOR OPERATIONS ON FEDERAL AND INDIAN LANDS

14. I hereby certify that the foregoing is true and correct. Name (Printed/Typed)

Marie E. Florez

Regulatory Specialist

Title

Signature

Marie E. Florez

Date

05/10/2018

THE SPACE FOR FEDERAL OR STATE OFFICE USE

Approved by

John Savage

Title

PE

Date

5/11/18

Conditions of approval, if any, are attached. Approval of this notice does not warrant or certify that the applicant holds legal or equitable title to those rights in the subject lease which would entitle the applicant to conduct operations thereon.

Office

FFO

Title 18 U.S.C Section 1001 and Title 43 U.S.C Section 1212, make it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious or fraudulent statements or representations as to any matter within its jurisdiction.

(Instructions on page 2)

NMOCDA

DISTRICT IV
1820 S. St. Francis Dr., Santa Fe, NM 87506
Phone: (505) 476-3450 Fax: (505) 476-3453

Form C-102
Revised August 1, 2011
Submit one copy to appropriate
District Office

GLEN W. RUSSELL
Certificate Number

15703

Sundry Drilling Plan
LOGOS Operating, LLC

Change of Plans 5/10/2018

HEROS 2308 09L 2H
API # 30-045-35687
Lease Serial # NMNM18463

Surface Location: 1476 FSL, 240FWL

Legal Description: Sec 9, T23N, R8W (36.238493° N, 107.694840° W – NAD83)

Bottom Hole Location: 1634 FSL, 26 FEL

Legal Description: Sec 9, T23N, R8W (36.238871° N, 107.677911° W – NAD83)

San Juan County, NM

1. The elevation of the unprepared ground is 6,913 feet above sea level.
2. The geological name of the surface formation is the Nacimiento.
3. A rotary rig will be used to drill the well to a Proposed Total Depth of 5,269' TVD/10,351' MD.
4. Estimated top of important geological markers:

<u>Formation</u>	<u>Depth (TVD)(ft)</u>	<u>Depth (MD)(ft)</u>
Nacimiento	Surface	Surface
Ojo Alamo	861	862
Kirtland	1,066	1,070
Fruitland	1,197	1,204
Pictured Cliffs	1,551	1,568
Lewis	1,661	1,681
Cliff House	3,087	3,145
Menefee	3,112	3,171
Point Lookout	4,012	4,095
Mancos	4,188	4,276
Point of Entry	5,262	5,996

5. Estimated depth at which anticipated water, oil, gas or other mineral bearing formations are expected to be encountered:

<u>Formation</u>	<u>Depth (TVD)(ft)</u>	<u>Water/HydroCarbon</u>
Fruitland	1,197	Gas
Pictured Cliffs	1,551	Gas
Cliffhouse	3,087	Gas
Point Lookout	4,012	Gas
Mancos	4,188	Oil/Gas

6. All proposed casing is new and the program is as follows:

Casing	Size	Depth		Grade	Weight	Connection	PSI		x1000 lbs
		MD	TVD				Burst	Collapse	Tension
Surface	9-5/8"	0-320'	0-320'	J-55	36.00	STC	3520	2020	394
Intermediate	7"	0-5,996'	0-5,262'	J-55	23.00	LTC	4360	3270	313
Production	4-1/2"	5,846'-10,351'	5,262'-5,269'	P-110	11.60	LTC	10690	7560	279

7. Cementing Program:

- a. 12-1/4" hole x 9-5/8" casing at 320' will have cement circulated to surface with 100sks (100% excess true hole) Class H Cement with 1.0 % CaCl₂, 1/2 #/sk Poly-E-Flake 15.8 ppg, 1.17 ft³/sk. Note: CEMENT MUST BE CIRCULATED TO SURFACE. STANDARD BOW SPRING CENTRALIZERS SHALL BE PLACED ON THE FIRST 3 (BOTTOM 3) JOINTS OF CASING (1 PER JOINT) AND 1 EVERY 3RD JOINT TO SURFACE. 20 BBLS OF WATER FOLLOWED BY 20 BBLS OF MUDFLUSH AHEAD OF CEMENT AS SPACER. Test Surface Casing to 1500psi.
- a. 8-3/4" hole x 7" casing at 5,996'. Cement will be circulated to surface in a single stage with 545 sks (60% excess true hole) of HALCEM with 1.0 % CaCl₂, 1/4 #/sk Poly-E-Flake, 5 #/sk Kol-Seal (Gilsonite) - 12.3 ppg, 1.95 ft³/sk followed by 279 sks (60% excess true hole) VARICEM with 0.15% Versaset, 0.30% HALAD-9, 1/4 #/sk Poly-E-Flake, 5 #/sk Kol-Seal - 13.5 ppg, 1.3 ft³/sk. ONE CENTRALIZER PER JOINT FOR THE FIRST 3 JOINTS, THEN EVERY OTHER JOINT TO KOP, THEN ONE EVERY 3RD JOINT TO SURFACE. 20 BBLS OF WATER FOLLOWED BY 30 BBLS OF MUDFLUSH AHEAD OF CEMENT AS SPACER. Test Intermediate Casing to 1500 psi. Cement additives subject to change based on wellbore conditions and cement design criteria.
- a. 6-1/8" hole x 4-1/2" liner at 10,351' MD in a single stage using excess of approximately 30% for TOC at 5846'. Base slurry to consist of 406 sks EXTENDACEM - 13.3 ppg, 1.36 ft³/sk. CENTRALIZERS TO BE USED AT DISCRETION IN LATERAL TO ACHIEVE 70% STAND OFF. CENTRALIZERS TO BE USED TO TIE BACK DEPTH OF 6000' TO ACHIEVE 70% STAND OFF. PACKOFF SEAL ASSEMBLY TO BE USED FOR LINER TOP ISOLATION. Cement additives subject to change based on wellbore conditions and cement design criteria. Liner to be pressure tested during completion operations.

8. Pressure Control Equipment

- a. BOPE to be installed prior to Surface Casing drillout.
- b. Pressure control equipment will be used to meet 2,000 (2M) psi specifications.
- c. BOPE working pressure of 3,000 psi.
- d. Function test and visual inspection to be done at each casing size change prior to drill out.
- e. BOP annular to be tested to 50% of working pressure.
- f. All BOP and related equipment will be tested in accordance with the requirements outlined in Onshore Order No. 2 and Notice to Operators dated May 27, 2005.
- g. BOP remote controls to be located on rig floor and readily accessible, master control on ground at accumulator will be able to function all preventors.
- h. Kill line will be 2 in min and have two kill line valves, one being a check valve.
- i. Choke line will be 2 in min and have two choke line valves, choke manifold with have two adjustable chokes, one manual and one remote. All choke lines will be as straight as possible. Any turns will be properly targeted using block and/or running tees. Choke line and manifold to be pressure tested to 1,500 psi.
- j. Float sub and TIW valve will be on the rig floor at all times.
- k. If high pressure co-flex hoses are used, they will be run as straight as possible and anchored to prevent whip.
- l. The main discharge line (panic line) will be at least 100' from the choke manifold and discharged into an appropriately sized discharge facility.

9. Mud Program:

0' - 320'	Fresh water/Spud Mud. Paper for losses and seepage. 8.4 to 8.8 ppg, 32 to 44 vis, PV <8, YP 2 to 13, FLNC, LGS < 3%
320' - 5,996'	KCL WBM. As needed LCM for losses and seepage. 9.0 to 9.5 ppg, pH 9.0-9.5, 38 to 45 vis, PV 8-14, YP 8-14, FL <20cc/30min, LGS <6%
5,996' - 10,351'	LSND WBM. As needed LCM for losses and seepage. 8.8 to 9.0 ppg, PH 9.0-9.5, 34 to 38 vis, PV 4-8, YP 6-8, FL <8cc/30min, LGS < 4%

****During drilling operations, all necessary products will be sufficiently stored on location for abnormal situations. The characteristics, use, testing of drilling mud and the implementation of related drilling procedures shall be designed to prevent the loss of well control. Sufficient quantities of mud materials shall be maintained or readily accessible for the purpose of assuring well control.**

****A pH of 10 or above in the fresh water base mud system shall be maintained to control the effects corrosion has on metallurgy of equipment used.**

Operating and Maintenance

LOGOS Operating, LLC will be using all above ground steel pits for fluid and cuttings while drilling. If any tank develops a leak we will have immediate visual discovery, we would then transfer the fluid to another tank then remove any contaminated soil and dispose of it in the cuttings bins for transportation. Any leaks, spills or other undesirable events will be reported in accordance with BLM NTL 3A. Rig crews will monitor the tanks at all times. A trip/surge tank will be used to monitor returns for any "kicks" of formation fluids.

Equipment:

- (1) Grinder/Particle Sizer Package
- (2) HS-2172 Variable Speed/High Volume Centrifuges w/ HCCS Stand & Feed Pumps
- (1) DWU 250 – Dewatering Unit/Command Center
- (1) High-Sided Drive-In Tank

10. Testing, Logging and Coring Program:

- a. Testing Program: No drillstem tests are anticipated
- b. Electric Logging Program: TBD
- c. LWD Program: TBD
- d. Coring Program: None.
- e. CBL's and/or Temperature Surveys Will Be Performed as Needed or Required.

- 11. Bottom Hole Pressure expected to be 2,500 +/- psi
- 12. Bottom Hole Temperature expected to be 160 deg F.

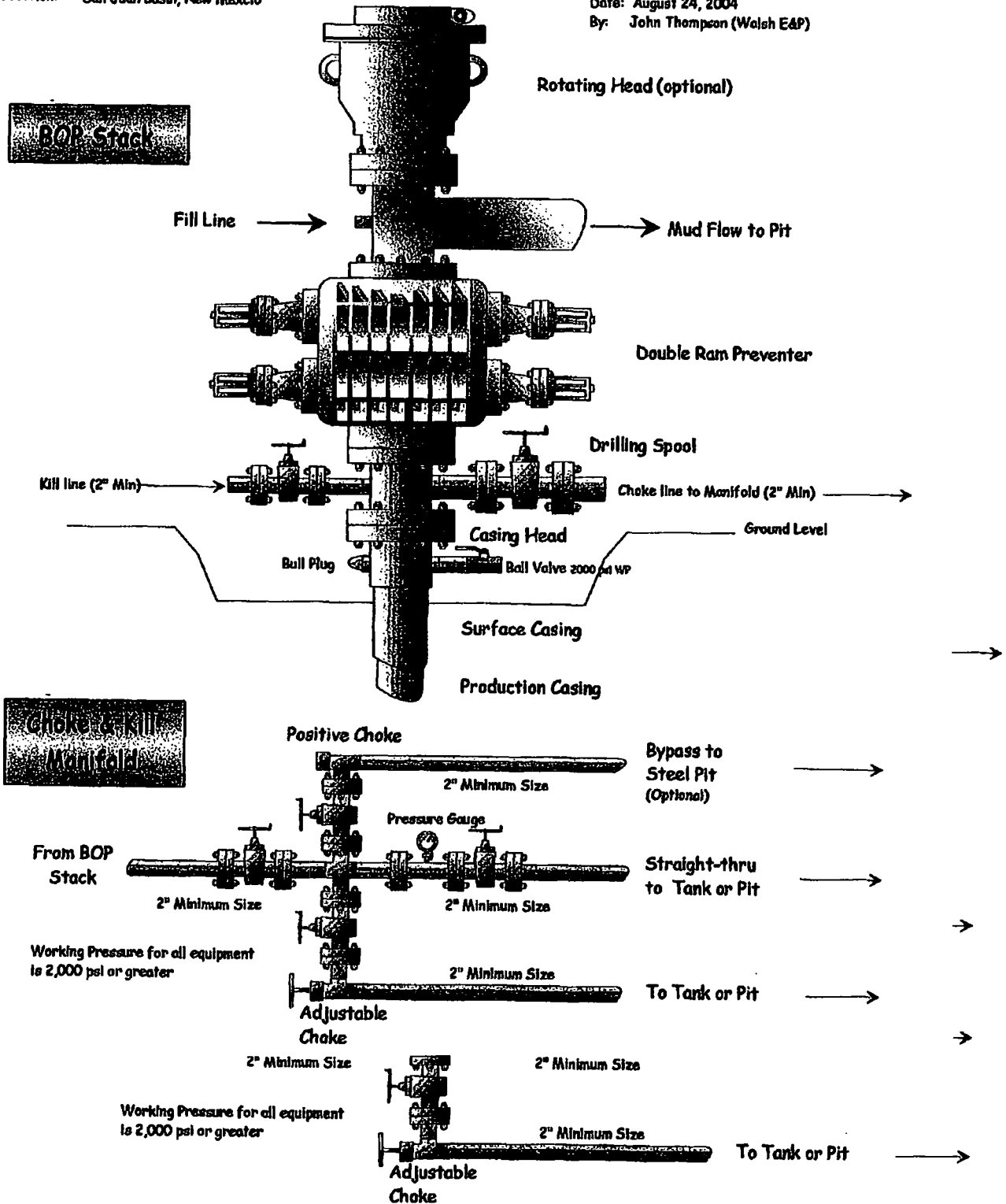
Well Control Equipment Schematic for 2M Service

Attachment to Drilling Technical Program

Exhibit #1 Typical BOP setup

Location: San Juan Basin, New Mexico

Date: August 24, 2004
By: John Thompson (Walsh E&P)





Company: Logos Operating LLC
Project: San Juan, NM NAD83
Site: Heros 2308-09L
Well: Heros 2308-09L 2H
Wellbore: OH
Design: Plan #6

PROJECT DETAILS: San Juan, NM NAD83

Geodetic System: US State Plane 1983
Datum: North American Datum 1983
Ellipsoid: GRS 1980
Zone: New Mexico Western Zone
System Datum: Mean Sea Level
Local North: True



Azimuths to True North
Magnetic North: 8.92°

Magnetic Field
Strength: 49561.8nT
Dip Angle: 62.83°
Date: 5/1/2018
Model: HDGM

WELL DETAILS: Heros 2308-09L 2H

GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)

+N/-S +E/-W Northing Easting Latitude Longitude
0.00 0.00 1906138.88 2763932.56 36.2384930 -107.6948400 2H

Plan: Plan #6 (Heros 2308-09L 2H/OH)

Created By: Janie Collins Date: 12:06, May 10 2018

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting
Heros 2308-09L 2H LP	5262.00	773.02	684.11	1906912.88	2764615.56
Heros 2308-09L 2H BHL	5269.00	137.87	4992.20	1906283.88	2768924.56
Heros 2308-09L 2H First Perf	5269.00	148.98	4913.22	1906294.88	2768845.56
Heros 2308-09L 2H Last Perf	5262.00	751.81	832.07	1906891.88	2764763.56

SECTION DETAILS

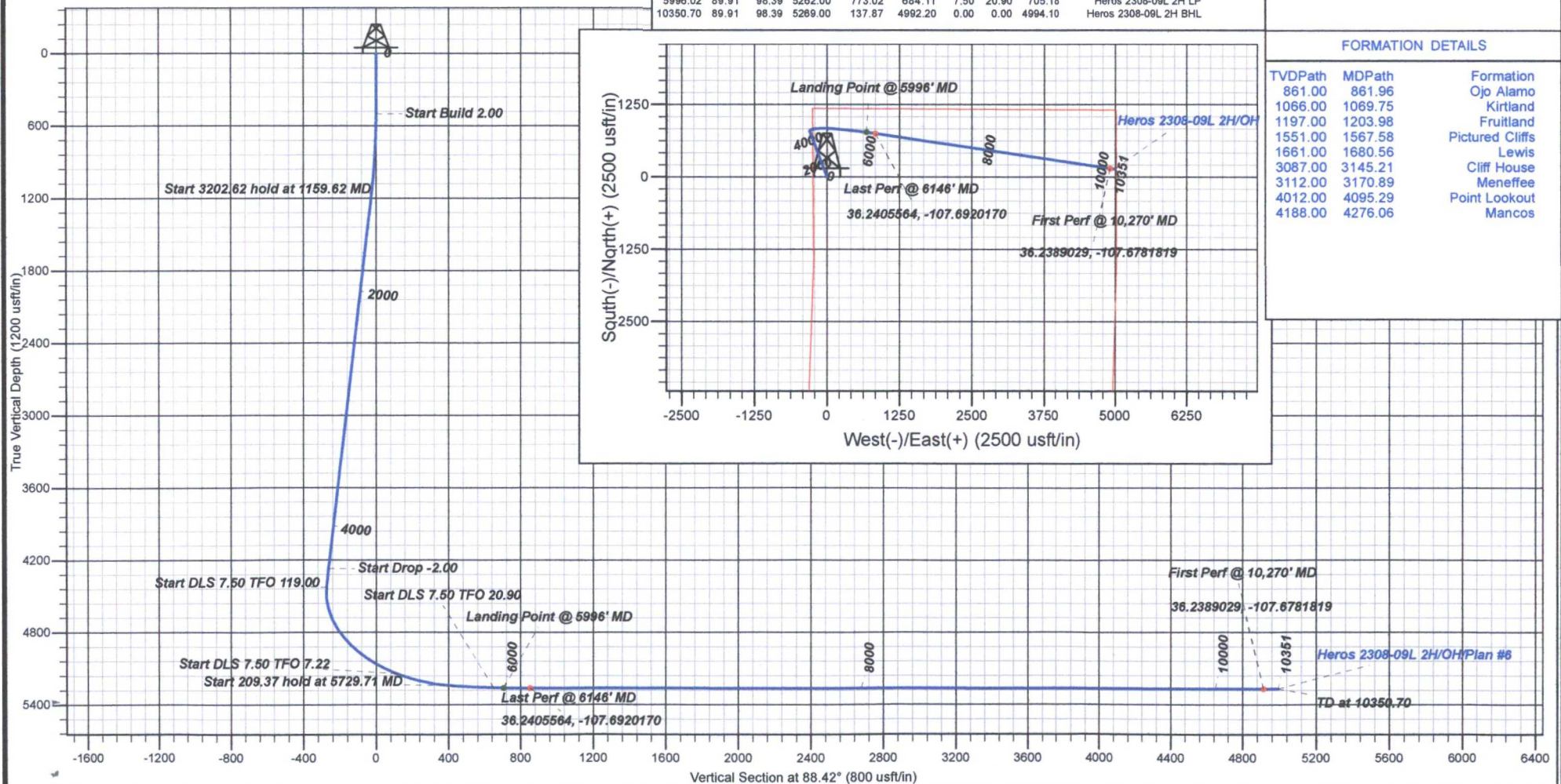
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	
1159.62	13.19	339.40	1153.81	70.77	-26.60	2.00	339.40	-24.63	
4362.25	13.19	339.40	4271.91	754.97	-263.71	0.00	0.00	-262.76	
4521.87	10.00	339.40	4428.26	785.00	-295.00	2.00	180.00	-273.22	
5381.83	60.00	93.69	5143.92	836.50	92.11	7.50	119.00	115.16	
5729.71	85.92	96.86	5245.02	805.54	420.38	7.50	7.22	442.45	
5939.08	85.92	96.86	5259.93	780.57	627.72	0.00	0.00	649.03	
5996.02	89.91	98.39	5262.00	773.02	684.11	7.50	20.90	705.18	Heros 2308-09L 2H LP
10350.70	89.91	98.39	5269.00	137.87	4992.20	0.00	0.00	4994.10	Heros 2308-09L 2H BHL

CASING DETAILS

TVD MD Name

FORMATION DETAILS

TVDPath	MDPath	Formation
861.00	861.96	Ojo Alamo
1066.00	1069.75	Kirtland
1197.00	1203.98	Fruitland
1551.00	1567.58	Pictured Cliffs
1661.00	1680.56	Lewis
3087.00	3145.21	Cliff House
3112.00	3170.89	Meneffee
4012.00	4095.29	Point Lookout
4188.00	4276.06	Mancos





Logos Operating LLC

San Juan, NM NAD83

Heros 2308-09L

Heros 2308-09L 2H - Slot 2H

OH

Plan: Plan #6

Standard Planning Report

10 May, 2018



www.scientificdrilling.com



Scientific Drilling, Intl
Planning Report



Database:	Grand Junction District	Local Co-ordinate Reference:	Well Heros 2308-09L 2H - Slot 2H
Company:	Logos Operating LLC	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Project:	San Juan, NM NAD83	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site:	Heros 2308-09L	North Reference:	True
Well:	Heros 2308-09L 2H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #6		

Project	San Juan, NM NAD83		
Map System:	US State Plane 1983	System Datum:	Mean Sea Level
Geo Datum:	North American Datum 1983		
Map Zone:	New Mexico Western Zone		

Site		Heros 2308-09L			
Site Position:		Northing:	1,906,138.89 usft	Latitude:	36.2384930
From:	Map	Easting:	2,763,932.56 usft	Longitude:	-107.6948400
Position Uncertainty:	0.00 usft	Slot Radius:	13.20 in	Grid Convergence:	0.08 °

Well	Heros 2308-09L 2H - Slot 2H					
Well Position	+N/-S	0.00 usft	Northing:	1,906,138.89 usft	Latitude:	36.2384930
	+E/-W	0.00 usft	Easting:	2,763,932.56 usft	Longitude:	-107.6948400
Position Uncertainty		0.00 usft	Wellhead Elevation:	0.00 usft	Ground Level:	6,913.00 usft

Wellbore	OH				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	HDGM	5/1/2018	8.92	62.83	49,562

Design	Plan #6			
Audit Notes:				
Version:	Phase:	PLAN	Tie On Depth:	0.00
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.00	0.00	0.00	88.42

Plan Sections										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	TFO (°)	Target
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00	
1,159.62	13.19	339.40	1,153.81	70.77	-26.60	2.00	2.00	0.00	339.40	
4,362.25	13.19	339.40	4,271.91	754.97	-283.71	0.00	0.00	0.00	0.00	
4,521.87	10.00	339.40	4,428.26	785.00	-295.00	2.00	-2.00	0.00	180.00	
5,381.83	60.00	93.69	5,143.92	836.50	92.11	7.50	5.81	13.29	119.00	
5,729.71	85.92	96.86	5,245.02	805.54	420.38	7.50	7.45	0.91	7.22	
5,939.08	85.92	96.86	5,259.93	780.57	627.72	0.00	0.00	0.00	0.00	
5,996.02	89.91	98.39	5,262.00	773.02	684.11	7.50	7.01	2.67	20.90	Heros 2308-09L 2H L
10,350.70	89.91	98.39	5,269.00	137.87	4,992.20	0.00	0.00	0.00	0.00	Heros 2308-09L 2H B



Scientific Drilling, Intl Planning Report



Database:	Grand Junction District	Local Co-ordinate Reference:	Well Heros 2308-09L 2H - Slot 2H
Company:	Logos Operating LLC	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Project:	San Juan, NM NAD83	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site:	Heros 2308-09L	North Reference:	True
Well:	Heros 2308-09L 2H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #6		

Planned Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00	
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00	
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00	
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00	
Start Build 2.00										
600.00	2.00	339.40	599.98	1.63	-0.61	-0.57	2.00	2.00	0.00	
700.00	4.00	339.40	699.84	6.53	-2.45	-2.27	2.00	2.00	0.00	
800.00	6.00	339.40	799.45	14.69	-5.52	-5.11	2.00	2.00	0.00	
861.96	7.24	339.40	861.00	21.38	-8.03	-7.44	2.00	2.00	0.00	
Ojo Alamo										
900.00	8.00	339.40	898.70	26.10	-9.81	-9.08	2.00	2.00	0.00	
1,000.00	10.00	339.40	997.47	40.74	-15.31	-14.18	2.00	2.00	0.00	
1,069.75	11.39	339.40	1,066.00	52.86	-19.86	-18.40	2.00	2.00	0.00	
Kirtland										
1,100.00	12.00	339.40	1,095.62	58.60	-22.02	-20.40	2.00	2.00	0.00	
1,159.62	13.19	339.40	1,153.81	70.77	-26.60	-24.63	2.00	2.00	0.00	
Start 3202.62 hold at 1159.62 MD										
1,200.00	13.19	339.40	1,193.12	79.40	-29.84	-27.63	0.00	0.00	0.00	
1,203.98	13.19	339.40	1,197.00	80.25	-30.16	-27.93	0.00	0.00	0.00	
Fruitland										
1,300.00	13.19	339.40	1,290.48	100.76	-37.87	-35.07	0.00	0.00	0.00	
1,400.00	13.19	339.40	1,387.84	122.13	-45.89	-42.51	0.00	0.00	0.00	
1,500.00	13.19	339.40	1,485.20	143.49	-53.92	-49.94	0.00	0.00	0.00	
1,567.58	13.19	339.40	1,551.00	157.93	-59.35	-54.97	0.00	0.00	0.00	
Pictured Cliffs										
1,600.00	13.19	339.40	1,582.57	164.85	-61.95	-57.38	0.00	0.00	0.00	
1,680.56	13.19	339.40	1,661.00	182.06	-68.42	-63.37	0.00	0.00	0.00	
Lewis										
1,700.00	13.19	339.40	1,679.93	186.22	-69.98	-64.81	0.00	0.00	0.00	
1,800.00	13.19	339.40	1,777.29	207.58	-78.01	-72.25	0.00	0.00	0.00	
1,900.00	13.19	339.40	1,874.65	228.94	-86.04	-79.68	0.00	0.00	0.00	
2,000.00	13.19	339.40	1,972.01	250.31	-94.06	-87.12	0.00	0.00	0.00	
2,100.00	13.19	339.40	2,069.37	271.67	-102.09	-94.55	0.00	0.00	0.00	
2,200.00	13.19	339.40	2,166.73	293.03	-110.12	-101.99	0.00	0.00	0.00	
2,300.00	13.19	339.40	2,264.09	314.40	-118.15	-109.43	0.00	0.00	0.00	
2,400.00	13.19	339.40	2,361.45	335.76	-126.18	-116.86	0.00	0.00	0.00	
2,500.00	13.19	339.40	2,458.81	357.12	-134.21	-124.30	0.00	0.00	0.00	
2,600.00	13.19	339.40	2,556.17	378.49	-142.23	-131.73	0.00	0.00	0.00	
2,700.00	13.19	339.40	2,653.53	399.85	-150.26	-139.17	0.00	0.00	0.00	
2,800.00	13.19	339.40	2,750.90	421.22	-158.29	-146.60	0.00	0.00	0.00	
2,900.00	13.19	339.40	2,848.26	442.58	-166.32	-154.04	0.00	0.00	0.00	
3,000.00	13.19	339.40	2,945.62	463.94	-174.35	-161.47	0.00	0.00	0.00	
3,100.00	13.19	339.40	3,042.98	485.31	-182.38	-168.91	0.00	0.00	0.00	
3,145.22	13.19	339.40	3,087.00	494.97	-186.01	-172.27	0.00	0.00	0.00	
Cliff House										
3,170.89	13.19	339.40	3,112.00	500.45	-188.07	-174.18	0.00	0.00	0.00	
Meneffee										
3,200.00	13.19	339.40	3,140.34	506.67	-190.40	-176.35	0.00	0.00	0.00	
3,300.00	13.19	339.40	3,237.70	528.03	-198.43	-183.78	0.00	0.00	0.00	



Scientific Drilling, Intl Planning Report



Database:	Grand Junction District	Local Co-ordinate Reference:	Well Heros 2308-09L 2H - Slot 2H
Company:	Logos Operating LLC	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Project:	San Juan, NM NAD83	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site:	Heros 2308-09L	North Reference:	True
Well:	Heros 2308-09L 2H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #6		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
3,400.00	13.19	339.40	3,335.06	549.40	-206.46	-191.22	0.00	0.00	0.00
3,500.00	13.19	339.40	3,432.42	570.76	-214.49	-198.65	0.00	0.00	0.00
3,600.00	13.19	339.40	3,529.78	592.12	-222.52	-206.09	0.00	0.00	0.00
3,700.00	13.19	339.40	3,627.14	613.49	-230.55	-213.52	0.00	0.00	0.00
3,800.00	13.19	339.40	3,724.50	634.85	-238.57	-220.96	0.00	0.00	0.00
3,900.00	13.19	339.40	3,821.87	656.21	-246.60	-228.39	0.00	0.00	0.00
4,000.00	13.19	339.40	3,919.23	677.58	-254.63	-235.83	0.00	0.00	0.00
4,095.29	13.19	339.40	4,012.00	697.94	-262.28	-242.91	0.00	0.00	0.00
Point Lookout									
4,100.00	13.19	339.40	4,016.59	698.94	-262.66	-243.26	0.00	0.00	0.00
4,200.00	13.19	339.40	4,113.95	720.31	-270.69	-250.70	0.00	0.00	0.00
4,276.06	13.19	339.40	4,188.00	736.55	-276.79	-256.36	0.00	0.00	0.00
Mancos									
4,300.00	13.19	339.40	4,211.31	741.67	-278.72	-258.14	0.00	0.00	0.00
4,362.25	13.19	339.40	4,271.91	754.97	-283.71	-262.76	0.00	0.00	0.00
Start Drop -2.00									
4,400.00	12.44	339.40	4,308.73	762.81	-286.66	-265.49	2.00	-2.00	0.00
4,500.00	10.44	339.40	4,406.73	781.37	-293.63	-271.95	2.00	-2.00	0.00
4,521.87	10.00	339.40	4,428.26	785.00	-295.00	-273.22	2.00	-2.00	0.00
Start DLS 7.50 TFO 119.00									
4,600.00	8.79	15.16	4,505.40	797.12	-295.83	-273.71	7.50	-1.55	45.77
4,700.00	12.15	53.23	4,603.84	810.81	-285.38	-262.89	7.50	3.36	38.06
4,800.00	18.15	70.83	4,700.37	822.24	-262.21	-239.41	7.50	6.00	17.60
4,900.00	24.96	79.50	4,793.34	831.22	-226.70	-203.67	7.50	6.81	8.67
5,000.00	32.06	84.58	4,881.17	837.58	-179.46	-156.27	7.50	7.10	5.08
5,100.00	39.30	87.96	4,962.35	841.22	-121.31	-98.04	7.50	7.24	3.38
5,200.00	46.61	90.43	5,035.49	842.08	-53.22	-29.96	7.50	7.31	2.47
5,300.00	53.96	92.36	5,099.34	840.14	23.62	46.80	7.50	7.35	1.93
5,381.83	60.00	93.69	5,143.92	836.50	92.11	115.16	7.50	7.38	1.62
Start DLS 7.50 TFO 7.22									
5,400.00	61.35	93.88	5,152.81	835.45	107.91	130.93	7.50	7.44	1.07
5,500.00	68.80	94.88	5,194.93	828.51	198.26	221.06	7.50	7.45	1.00
5,600.00	76.25	95.78	5,224.94	819.64	293.17	315.68	7.50	7.45	0.90
5,700.00	83.70	96.62	5,242.33	809.01	390.99	413.18	7.50	7.45	0.84
5,729.71	85.92	96.86	5,245.02	805.54	420.38	442.45	7.50	7.46	0.82
Start 209.37 hold at 5729.71 MD									
5,800.00	85.92	96.86	5,250.03	797.16	489.98	511.80	0.00	0.00	0.00
5,900.00	85.92	96.86	5,257.14	785.23	589.01	610.47	0.00	0.00	0.00
5,939.08	85.92	96.86	5,259.93	780.57	627.72	649.03	0.00	0.00	0.00
Start DLS 7.50 TFO 20.90									
5,996.02	89.91	98.39	5,262.00	773.02	684.11	705.18	7.50	7.01	2.67
Landing Point @ 5996' MD - Heros 2308-09L 2H LP									
6,000.00	89.91	98.39	5,262.01	772.44	688.04	709.10	0.00	0.00	0.00
6,100.00	89.91	98.39	5,262.17	757.86	786.97	807.59	0.00	0.00	0.00
6,145.50	89.91	98.39	5,262.24	751.22	831.99	852.41	0.00	0.00	0.00
Heros 2308-09L 2H Last Perf									
6,146.00	89.91	98.39	5,262.24	751.15	832.48	852.90	0.00	0.00	0.00
Last Perf @ 6146' MD - 36.2405564, -107.6920170									
6,200.00	89.91	98.39	5,262.33	743.27	885.90	906.08	0.00	0.00	0.00
6,300.00	89.91	98.39	5,262.49	728.69	984.83	1,004.57	0.00	0.00	0.00
6,400.00	89.91	98.39	5,262.65	714.10	1,083.76	1,103.06	0.00	0.00	0.00



Scientific Drilling, Intl
Planning Report



Database:	Grand Junction District	Local Co-ordinate Reference:	Well Heros 2308-09L 2H - Slot 2H
Company:	Logos Operating LLC	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Project:	San Juan, NM NAD83	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site:	Heros 2308-09L	North Reference:	True
Well:	Heros 2308-09L 2H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #6		

Planned Survey									
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
6,500.00	89.91	98.39	5,262.81	699.51	1,182.69	1,201.55	0.00	0.00	0.00
6,600.00	89.91	98.39	5,262.97	684.93	1,281.62	1,300.04	0.00	0.00	0.00
6,700.00	89.91	98.39	5,263.13	670.34	1,380.55	1,398.53	0.00	0.00	0.00
6,800.00	89.91	98.39	5,263.29	655.76	1,479.48	1,497.02	0.00	0.00	0.00
6,900.00	89.91	98.39	5,263.45	641.17	1,578.41	1,595.51	0.00	0.00	0.00
7,000.00	89.91	98.39	5,263.61	626.59	1,677.34	1,694.00	0.00	0.00	0.00
7,100.00	89.91	98.39	5,263.77	612.00	1,776.27	1,792.49	0.00	0.00	0.00
7,200.00	89.91	98.39	5,263.94	597.42	1,875.20	1,890.98	0.00	0.00	0.00
7,300.00	89.91	98.39	5,264.10	582.83	1,974.13	1,989.47	0.00	0.00	0.00
7,400.00	89.91	98.39	5,264.26	568.24	2,073.07	2,087.96	0.00	0.00	0.00
7,500.00	89.91	98.39	5,264.42	553.66	2,172.00	2,186.45	0.00	0.00	0.00
7,600.00	89.91	98.39	5,264.58	539.07	2,270.93	2,284.94	0.00	0.00	0.00
7,700.00	89.91	98.39	5,264.74	524.49	2,369.86	2,383.43	0.00	0.00	0.00
7,800.00	89.91	98.39	5,264.90	509.90	2,468.79	2,481.92	0.00	0.00	0.00
7,900.00	89.91	98.39	5,265.06	495.32	2,567.72	2,580.41	0.00	0.00	0.00
8,000.00	89.91	98.39	5,265.22	480.73	2,666.65	2,678.90	0.00	0.00	0.00
8,100.00	89.91	98.39	5,265.38	466.14	2,765.58	2,777.39	0.00	0.00	0.00
8,200.00	89.91	98.39	5,265.54	451.56	2,864.51	2,875.88	0.00	0.00	0.00
8,300.00	89.91	98.39	5,265.70	436.97	2,963.44	2,974.37	0.00	0.00	0.00
8,400.00	89.91	98.39	5,265.86	422.39	3,062.37	3,072.86	0.00	0.00	0.00
8,500.00	89.91	98.39	5,266.03	407.80	3,161.30	3,171.35	0.00	0.00	0.00
8,600.00	89.91	98.39	5,266.19	393.22	3,260.23	3,269.84	0.00	0.00	0.00
8,700.00	89.91	98.39	5,266.35	378.63	3,359.16	3,368.33	0.00	0.00	0.00
8,800.00	89.91	98.39	5,266.51	364.04	3,458.09	3,466.82	0.00	0.00	0.00
8,900.00	89.91	98.39	5,266.67	349.46	3,557.02	3,565.31	0.00	0.00	0.00
9,000.00	89.91	98.39	5,266.83	334.87	3,655.95	3,663.80	0.00	0.00	0.00
9,100.00	89.91	98.39	5,266.99	320.29	3,754.88	3,762.29	0.00	0.00	0.00
9,200.00	89.91	98.39	5,267.15	305.70	3,853.81	3,860.78	0.00	0.00	0.00
9,300.00	89.91	98.39	5,267.31	291.12	3,952.74	3,959.27	0.00	0.00	0.00
9,400.00	89.91	98.39	5,267.47	276.53	4,051.67	4,057.76	0.00	0.00	0.00
9,500.00	89.91	98.39	5,267.63	261.95	4,150.60	4,156.25	0.00	0.00	0.00
9,600.00	89.91	98.39	5,267.79	247.36	4,249.54	4,254.74	0.00	0.00	0.00
9,700.00	89.91	98.39	5,267.95	232.77	4,348.47	4,353.23	0.00	0.00	0.00
9,800.00	89.91	98.39	5,268.11	218.19	4,447.40	4,451.72	0.00	0.00	0.00
9,900.00	89.91	98.39	5,268.28	203.60	4,546.33	4,550.21	0.00	0.00	0.00
10,000.00	89.91	98.39	5,268.44	189.02	4,645.26	4,648.70	0.00	0.00	0.00
10,100.00	89.91	98.39	5,268.60	174.43	4,744.19	4,747.19	0.00	0.00	0.00
10,200.00	89.91	98.39	5,268.76	159.85	4,843.12	4,845.68	0.00	0.00	0.00
10,270.00	89.91	98.39	5,268.87	149.64	4,912.37	4,914.63	0.00	0.00	0.00
First Perf @ 10,270' MD - 36.2389029, -107.6781819									
10,270.94	89.91	98.39	5,268.87	149.50	4,913.29	4,915.55	0.00	0.00	0.00
Heros 2308-09L 2H First Perf									
10,300.00	89.91	98.39	5,268.92	145.26	4,942.05	4,944.17	0.00	0.00	0.00
10,350.70	89.91	98.39	5,269.00	137.87	4,992.20	4,994.10	0.00	0.00	0.00
TD at 10350.70 - Heros 2308-09L 2H BHL									



Scientific Drilling, Intl Planning Report



Database:	Grand Junction District	Local Co-ordinate Reference:	Well Heros 2308-09L 2H - Slot 2H
Company:	Logos Operating LLC	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Project:	San Juan, NM NAD83	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site:	Heros 2308-09L	North Reference:	True
Well:	Heros 2308-09L 2H	Survey Calculation Method:	Minimum Curvature
Wellbore:	OH		
Design:	Plan #6		

Design Targets

Target Name

- hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Heros 2308-09L 2H Last - plan misses target center by 0.64usft at 6145.50usft MD (5262.24 TVD, 751.22 N, 831.99 E) - Point	0.00	0.00	5,262.00	751.81	832.07	1,906,891.89	2,764,763.56	36.2405582	-107.6920184
Heros 2308-09L 2H LP - plan hits target center - Point	0.00	0.00	5,262.00	773.02	684.11	1,906,912.89	2,764,615.56	36.2406165	-107.6925202
Heros 2308-09L 2H BHL - plan hits target center - Point	0.00	0.00	5,269.00	137.87	4,992.20	1,906,283.89	2,768,924.56	36.2388705	-107.6779112
Heros 2308-09L 2H First - plan misses target center by 0.54usft at 10270.94usft MD (5268.87 TVD, 149.50 N, 4913.29 E) - Point	0.00	0.00	5,269.00	148.98	4,913.22	1,906,294.89	2,768,845.56	36.2389011	-107.6781790

Formations

Measured Depth (usft)	Vertical Depth (usft)	Name	Lithology	Dip (°)	Dip Direction (°)
861.96	861.00	Ojo Alamo		0.00	0.00
1,069.75	1,066.00	Kirtland		0.00	0.00
1,203.98	1,197.00	Fruitland		0.00	0.00
1,567.58	1,551.00	Pictured Cliffs		0.00	0.00
1,680.56	1,661.00	Lewis		0.00	0.00
3,145.22	3,087.00	Cliff House		0.00	0.00
3,170.89	3,112.00	Meneffee		0.00	0.00
4,095.29	4,012.00	Point Lookout		0.00	0.00
4,276.06	4,188.00	Mancos		0.00	0.00

Plan Annotations

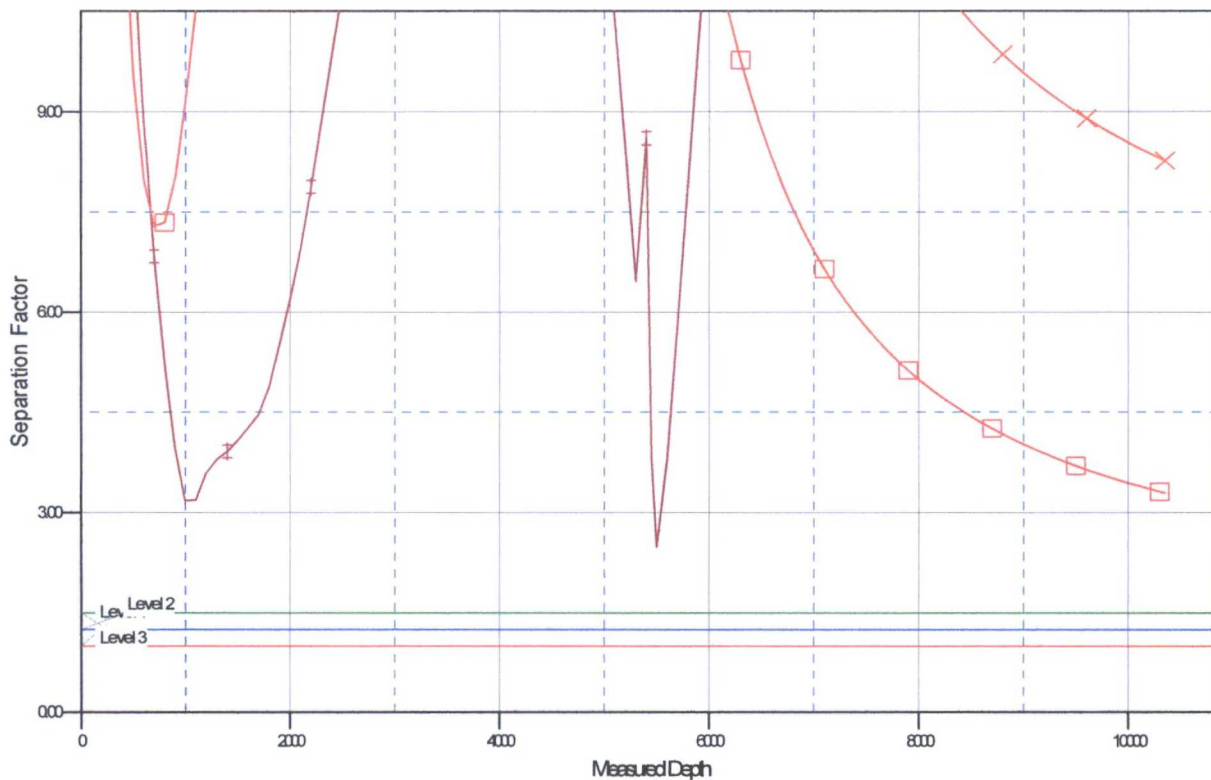
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
500.00	500.00	0.00	0.00	Start Build 2.00
1,159.62	1,153.81	70.77	-26.60	Start 3202.62 hold at 1159.62 MD
4,362.25	4,271.91	754.97	-283.71	Start Drop -2.00
4,521.87	4,428.26	785.00	-295.00	Start DLS 7.50 TFO 119.00
5,381.83	5,143.92	836.50	92.11	Start DLS 7.50 TFO 7.22
5,729.71	5,245.02	805.54	420.38	Start 209.37 hold at 5729.71 MD
5,939.08	5,259.93	780.57	627.72	Start DLS 7.50 TFO 20.90
5,996.02	5,262.00	773.02	684.11	Landing Point @ 5996' MD
6,146.00	5,262.24	751.15	832.48	Last Perf @ 6146' MD
6,146.00	5,262.24	751.15	832.48	36.2405564, -107.6920170
10,270.00	5,268.87	149.64	4,912.37	First Perf @ 10,270' MD
10,270.00	5,268.87	149.64	4,912.37	36.2389029, -107.6781819
10,350.70	5,269.00	137.87	4,992.20	TD at 10350.70

Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 2H - Slot 2H
Project:	San Juan, NM NAD83	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Reference Site:	Heros 2308-09L	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Heros 2308-09L 2H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #6	Offset TVD Reference:	Offset Datum

Reference Depths are relative to GL 6913' & RKB 25' @ 6938.00usft (A)
Offset Depths are relative to Offset Datum
Central Meridian is -107.8333334

Coordinates are relative to: Heros 2308-09L 2H - Slot 2H
Coordinate System is US State Plane 1983, New Mexico Western Zone
Grid Convergence at Surface is: 0.08°

Separation Factor Plot



LEGEND

- ✕ Heros 2308-09L 5H, OH, Plan #2 V0
- ▲ State NM 16 #21 Unit C, OH, OH V0
- ◻ Heros 2308-09L 3H, OH, Plan #6 V0
- Heros 2308-09L 4H, OH, Plan #6 V0
- ◆ Heros 2308-09L 1H, OH, OH V0



Logos Operating LLC

San Juan, NM NAD83

Heros 2308-09L

Heros 2308-09L 2H

OH

Plan #6

Anticollision Report

10 May, 2018



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Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 2H - Slot 2H
Project:	San Juan, NM NAD83	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Reference Site:	Heros 2308-09L	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Heros 2308-09L 2H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #6	Offset TVD Reference:	Offset Datum

Reference	Plan #6
Filter type:	NO GLOBAL FILTER: Using user defined selection & filtering criteria
Interpolation Method:	MD Interval 100.00usft
Depth Range:	Unlimited
Results Limited by:	Maximum center-center distance of 15,000.00 usft
Warning Levels Evaluated at:	2.00 Sigma
Error Model:	ISCWSA
Scan Method:	Closest Approach 3D
Error Surface:	Elliptical Conic
Casing Method:	Not applied

Survey Tool Program		Date	5/10/2018		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
0.00	10,350.70	Plan #6 (OH)	MWD+HDGM	OWSG MWD + HDGM	

Summary						
Site Name	Reference Measured Depth (usft)	Offset Measured Depth (usft)	Distance Between Centres (usft)	Distance Between Ellipses (usft)	Separation Factor	Warning
Offset Well - Wellbore - Design						
Heros 2308-09L						
Heros 2308-09L 1H - OH - OH	994.79	972.98	19.80	13.61	3.200	CC
Heros 2308-09L 1H - OH - OH	1,000.00	978.17	19.80	13.58	3.180	ES
Heros 2308-09L 1H - OH - OH	5,500.00	5,728.53	95.67	57.21	2.487	SF
Heros 2308-09L 3H - OH - Plan #6	500.00	500.00	30.02	26.88	9.570	CC
Heros 2308-09L 3H - OH - Plan #6	600.00	599.98	30.73	26.88	7.976	ES
Heros 2308-09L 3H - OH - Plan #6	10,350.70	10,108.77	1,009.94	702.79	3.288	SF
Heros 2308-09L 4H - OH - Plan #6	500.00	500.00	60.00	56.86	19.129	CC
Heros 2308-09L 4H - OH - Plan #6	600.00	599.98	60.64	56.79	15.740	ES
Heros 2308-09L 4H - OH - Plan #6	900.00	898.70	74.56	68.55	12.408	SF
Heros 2308-09L 5H - OH - Plan #2	500.00	500.00	90.00	86.86	28.693	CC
Heros 2308-09L 5H - OH - Plan #2	600.00	599.98	90.63	86.78	23.525	ES
Heros 2308-09L 5H - OH - Plan #2	10,350.70	9,643.61	2,368.59	2,082.11	8.268	SF
State NM 16 #21 Unit C - OH - OH	7,600.21	5,239.87	2,945.73	2,716.11	12.829	CC
State NM 16 #21 Unit C - OH - OH	7,700.00	5,240.03	2,947.42	2,715.06	12.685	ES
State NM 16 #21 Unit C - OH - OH	8,300.00	5,240.99	3,027.72	2,780.91	12.268	SF

Offset Design													Offset Site Error: 0.00 usft	
Survey Program: 404-MWD													Offset Well Error: 0.00 usft	
Reference		Offset		Semi Major Axis			Distance							
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning	
0.00	0.00	0.00	0.00	0.00	0.00	-89.98	0.01	-30.09	37.28					
100.00	100.00	78.02	78.02	0.13	0.14	-90.01	0.00	-30.07	30.07	29.79	0.27	109.508		
200.00	200.00	178.04	178.04	0.49	0.32	-90.13	-0.07	-29.96	29.96	29.15	0.81	36.884		
300.00	300.00	278.07	278.07	0.85	0.50	-90.34	-0.18	-29.77	29.78	28.43	1.35	22.054		
400.00	400.00	378.09	378.09	1.21	0.68	-90.65	-0.33	-29.51	29.51	27.62	1.89	15.629		
471.65	471.65	449.65	449.65	1.47	0.88	-90.79	-0.40	-29.35	29.35	27.00	2.35	12.502		
500.00	500.00	477.97	477.97	1.57	0.98	-90.70	-0.36	-29.37	29.37	26.83	2.55	11.535		
600.00	599.98	578.04	578.04	1.93	1.32	-73.35	-0.34	-29.36	28.81	25.57	3.25	8.869		
700.00	699.84	678.19	678.17	2.29	1.67	-80.62	1.30	-29.00	27.06	23.10	3.96	6.837		
800.00	799.45	778.16	777.97	2.65	2.03	-87.78	7.07	-28.66	24.37	19.69	4.68	5.211		
900.00	898.70	878.36	877.82	3.02	2.38	-99.77	15.34	-28.40	21.51	16.07	5.44	3.954		

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 2H - Slot 2H
Project:	San Juan, NM NAD83	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Reference Site:	Heros 2308-09L	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Heros 2308-09L 2H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #6	Offset TVD Reference:	Offset Datum

Offset Design Heros 2308-09L - Heros 2308-09L 1H - OH - OH													Offset Site Error:	0.00 usft
Survey Program: 404-MWD													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Minimum Separation (usft)	Separation Factor	Warning			
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Between Centres (usft)	Between Ellipses (usft)				Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)
994.79	992.33	972.98	971.93	3.38	2.73	-117.90	25.20	-28.16	19.80	13.61	6.19	3,200	CC	
1,000.00	997.47	978.17	977.09	3.40	2.75	-119.14	25.76	-28.16	19.80	13.58	6.23	3,180	ES	
1,100.00	1,095.62	1,078.14	1,076.39	3.79	3.13	-143.09	37.27	-28.39	22.44	15.39	7.04	3,185		
1,200.00	1,193.12	1,178.46	1,175.67	4.21	3.52	-162.87	51.64	-28.26	28.18	20.32	7.85	3,588		
1,300.00	1,290.48	1,279.23	1,274.73	4.64	3.94	-177.09	70.07	-28.11	32.81	24.16	8.65	3,792		
1,400.00	1,387.84	1,379.52	1,372.61	5.08	4.38	167.91	91.81	-26.29	36.73	27.34	9.39	3,910		
1,500.00	1,485.20	1,479.46	1,469.31	5.52	4.85	151.40	116.78	-22.66	41.57	31.37	10.20	4,076		
1,600.00	1,582.57	1,579.63	1,565.33	5.97	5.35	135.49	145.05	-18.95	47.58	36.44	11.14	4,289		
1,700.00	1,679.93	1,679.58	1,660.01	6.43	5.89	120.18	176.94	-16.35	54.47	42.28	12.19	4,468		
1,800.00	1,777.29	1,777.47	1,751.05	6.88	6.47	104.74	212.79	-13.57	64.78	51.51	13.27	4,881		
1,900.00	1,874.65	1,875.77	1,841.60	7.34	7.08	92.27	250.97	-11.01	78.97	64.67	14.30	5,522		
2,000.00	1,972.01	1,974.60	1,932.63	7.80	7.71	83.41	289.43	-9.66	94.63	79.37	15.26	6,201		
2,100.00	2,069.37	2,070.75	2,020.27	8.27	8.36	75.93	328.96	-9.65	112.08	95.94	16.15	6,942		
2,200.00	2,166.73	2,164.49	2,104.29	8.73	9.03	69.62	370.51	-9.11	133.58	116.62	16.96	7,878		
2,300.00	2,264.09	2,259.94	2,188.95	9.20	9.74	64.39	414.59	-8.77	157.56	139.81	17.76	8,874		
2,400.00	2,361.45	2,355.64	2,273.57	9.67	10.47	60.50	459.27	-8.07	183.15	164.59	18.56	9,870		
2,500.00	2,458.81	2,449.59	2,357.49	10.14	11.17	58.48	501.38	-4.95	209.31	189.94	19.37	10,807		
2,600.00	2,556.17	2,541.88	2,439.38	10.61	11.88	57.09	543.69	-0.29	237.54	217.38	20.16	11,780		
2,700.00	2,653.53	2,642.83	2,529.64	11.08	12.64	56.43	588.38	6.48	265.51	244.39	21.12	12,571		
2,800.00	2,750.90	2,747.14	2,624.41	11.55	13.39	56.48	631.21	14.46	291.30	269.16	22.14	13,155		
2,900.00	2,848.26	2,855.87	2,724.79	12.02	14.15	56.60	672.51	20.57	313.20	289.99	23.21	13,495		
3,000.00	2,945.62	2,951.68	2,813.24	12.49	14.81	56.46	709.12	24.47	334.40	310.29	24.11	13,872		
3,100.00	3,042.98	3,061.60	2,915.20	12.96	15.56	56.26	750.08	27.65	354.13	328.97	25.16	14,077		
3,200.00	3,140.34	3,166.77	3,013.75	13.43	16.25	56.20	786.73	29.51	371.12	344.97	26.15	14,193		
3,300.00	3,237.70	3,256.70	3,097.87	13.91	16.84	56.02	818.52	30.45	388.14	361.15	26.99	14,382		
3,400.00	3,335.06	3,349.99	3,184.35	14.38	17.48	55.71	853.46	31.69	407.11	379.26	27.85	14,617		
3,500.00	3,432.42	3,435.00	3,262.66	14.85	18.08	55.37	886.51	33.04	427.56	398.95	28.60	14,947		
3,600.00	3,529.78	3,524.80	3,344.38	15.33	18.74	54.99	923.66	35.71	450.89	421.48	29.41	15,331		
3,700.00	3,627.14	3,626.25	3,436.61	15.80	19.49	54.64	965.77	39.26	474.66	444.28	30.38	15,623		
3,800.00	3,724.50	3,736.16	3,537.54	16.28	20.28	54.38	1,009.17	42.16	496.12	464.66	31.46	15,771		
3,900.00	3,821.87	3,829.26	3,623.27	16.75	20.94	54.23	1,045.36	44.85	517.27	484.94	32.33	16,002		
4,000.00	3,919.23	3,925.92	3,711.91	17.23	21.63	54.07	1,083.77	48.02	539.38	506.14	33.24	16,227		
4,100.00	4,016.59	4,021.42	3,799.40	17.70	22.32	53.87	1,121.96	50.68	561.45	527.32	34.13	16,449		
4,200.00	4,113.95	4,129.10	3,898.19	18.18	23.10	53.59	1,164.74	52.65	582.76	547.59	35.17	16,568		
4,300.00	4,211.31	4,220.74	3,982.47	18.65	23.75	53.38	1,200.70	54.12	603.54	567.53	36.02	16,756		
4,400.00	4,308.73	4,299.29	4,054.13	19.12	24.33	53.35	1,232.79	56.38	626.63	589.95	36.69	17,081		
4,500.00	4,406.73	4,376.91	4,124.15	19.57	24.92	53.55	1,266.02	60.52	654.39	617.11	37.28	17,555		
4,600.00	4,505.40	4,503.25	4,238.50	19.98	25.87	18.88	1,319.09	68.60	682.08	643.61	38.47	17,730		
4,700.00	4,603.84	5,082.27	4,796.28	20.33	26.97	-18.44	1,296.56	74.44	641.41	605.15	36.27	17,686		
4,800.00	4,700.37	5,220.68	4,913.33	20.61	26.61	-35.68	1,224.60	89.78	583.95	548.03	35.92	16,257		
4,900.00	4,793.34	5,339.66	5,007.43	20.85	26.25	-46.35	1,152.60	99.93	515.47	479.98	35.49	14,523		
5,000.00	4,881.17	5,456.02	5,093.02	21.04	25.89	-56.88	1,074.26	106.54	438.75	404.37	34.38	12,761		
5,100.00	4,962.35	5,513.56	5,130.63	21.20	25.71	-70.31	1,031.04	111.70	355.71	321.36	34.35	10,356		
5,200.00	5,035.49	5,632.58	5,194.63	21.33	25.31	-98.03	931.48	120.44	266.39	235.03	31.35	8,497		
5,300.00	5,099.34	5,678.60	5,212.36	21.44	25.14	-135.29	889.04	120.55	173.25	146.44	26.80	6,463		
5,400.00	5,152.81	5,704.78	5,220.83	21.60	25.05	-158.18	864.27	120.49	95.35	84.27	11.08	8,603		
5,449.73	5,175.23	5,716.57	5,224.31	21.84	25.00	-166.88	853.00	120.61	80.50	59.60	20.90	3,851		
5,500.00	5,194.93	5,728.53	5,227.59	22.28	24.97	-175.41	841.50	120.83	95.67	57.21	38.46	2,487	SF	
5,600.00	5,224.84	5,751.10	5,232.94	23.69	24.89	166.05	819.59	121.50	174.26	128.45	45.81	3,804		
5,700.00	5,242.33	5,774.55	5,237.46	25.43	24.82	136.82	796.60	122.61	269.22	223.04	46.18	5,830		

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 2H - Slot 2H
Project:	San Juan, NM NAD83	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Reference Site:	Heros 2308-09L	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Heros 2308-09L 2H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #6	Offset TVD Reference:	Offset Datum

Offset Design Heros 2308-09L - Heros 2308-09L 1H - OH - OH														Offset Site Error:	0.00 usft
Survey Program: 404-MWD														Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)					
5,800.00	5,250.03	5,799.82	5,241.37	27.39	24.75	119.45	771.70	124.26	366.85	320.72	46.13	7.953			
5,900.00	5,257.14	5,824.08	5,244.61	29.52	24.69	114.32	747.73	126.20	464.43	418.34	46.08	10.078			
6,000.00	5,262.01	5,843.00	5,246.99	31.79	24.64	93.61	729.03	127.78	561.98	515.91	46.07	12.199			
6,100.00	5,262.17	5,860.36	5,249.09	34.16	24.61	94.02	711.86	129.13	659.50	613.43	46.07	14.314			
6,200.00	5,262.33	5,868.00	5,249.97	36.62	24.59	94.16	704.28	129.65	757.31	711.25	46.06	16.440			
6,300.00	5,262.49	5,879.64	5,251.22	39.15	24.57	94.31	692.72	130.28	855.37	809.30	46.07	18.567			
6,400.00	5,262.65	5,886.42	5,251.88	41.75	24.55	94.37	685.98	130.53	953.71	907.65	46.07	20.703			
6,500.00	5,262.81	5,899.00	5,252.96	44.40	24.53	94.41	673.45	130.76	1,052.32	1,006.23	46.09	22.833			
6,600.00	5,262.97	5,899.00	5,252.96	47.09	24.53	94.41	673.45	130.76	1,150.98	1,104.91	46.07	24.984			
6,700.00	5,263.13	5,908.77	5,253.72	49.82	24.51	94.41	663.71	130.83	1,249.81	1,203.72	46.09	27.118			
6,800.00	5,263.29	5,922.29	5,254.72	52.57	24.49	94.41	650.23	130.90	1,348.66	1,302.53	46.13	29.237			
6,900.00	5,263.45	5,936.23	5,255.70	55.36	24.46	94.38	636.33	130.96	1,447.53	1,401.35	46.18	31.344			
7,000.00	5,263.61	5,951.28	5,256.67	58.16	24.44	94.34	621.30	131.02	1,546.41	1,500.15	46.25	33.433			
7,100.00	5,263.77	5,971.71	5,257.83	60.99	24.41	94.25	600.91	131.12	1,645.27	1,598.90	46.37	35.479			
7,200.00	5,263.94	6,003.31	5,259.21	63.83	24.38	94.06	569.34	131.51	1,744.01	1,697.40	46.61	37.417			
7,300.00	5,264.10	6,026.00	5,260.10	66.69	24.37	93.93	546.67	131.93	1,842.65	1,795.84	46.81	39.367			
7,400.00	5,264.26	6,039.14	5,260.63	69.56	24.37	93.87	533.54	132.19	1,941.27	1,894.34	46.93	41.366			
7,500.00	5,264.42	6,050.69	5,261.14	72.44	24.36	93.82	522.01	132.39	2,039.94	1,992.90	47.04	43.364			
7,600.00	5,264.58	6,064.00	5,261.79	75.33	24.36	93.78	508.72	132.58	2,138.64	2,091.46	47.18	45.327			
7,700.00	5,264.74	6,079.86	5,262.68	78.23	24.37	93.76	492.88	132.82	2,237.35	2,189.99	47.36	47.236			
7,800.00	5,264.90	6,108.90	5,264.65	81.13	24.38	93.77	463.92	133.30	2,336.04	2,288.30	47.74	48.934			
7,900.00	5,265.06	6,145.59	5,267.70	84.05	24.41	93.86	427.36	134.21	2,434.58	2,386.31	48.27	50.436			
8,000.00	5,265.22	6,163.59	5,269.14	86.97	24.44	93.89	409.43	134.74	2,533.05	2,484.50	48.55	52.175			
8,100.00	5,265.38	6,177.72	5,270.19	89.90	24.46	93.91	395.34	135.14	2,631.53	2,582.76	48.77	53.953			
8,200.00	5,265.54	6,262.75	5,274.13	92.83	24.65	93.72	310.49	138.74	2,729.59	2,679.22	50.36	54.198			
8,300.00	5,265.70	6,276.73	5,274.43	95.76	24.68	93.65	296.54	139.45	2,827.64	2,777.00	50.64	55.838			
8,400.00	5,265.86	6,290.41	5,274.65	98.71	24.72	93.59	282.87	140.12	2,925.74	2,874.82	50.92	57.461			
8,500.00	5,266.03	6,307.00	5,274.83	101.65	24.77	93.51	266.30	140.90	3,023.87	2,972.61	51.26	58.990			
8,600.00	5,266.19	6,316.95	5,274.89	104.60	24.80	93.45	256.36	141.34	3,122.04	3,070.57	51.47	60.653			
8,700.00	5,266.35	6,329.82	5,274.92	107.55	24.85	93.38	243.51	141.89	3,220.25	3,168.50	51.76	62.220			
8,800.00	5,266.51	6,342.43	5,274.89	110.51	24.89	93.31	230.90	142.41	3,318.49	3,266.46	52.04	63.774			
8,900.00	5,266.67	6,354.80	5,274.80	113.46	24.94	93.24	218.55	142.89	3,416.77	3,364.46	52.31	65.314			
9,000.00	5,266.83	6,369.00	5,274.64	116.43	24.99	93.16	204.36	143.42	3,515.08	3,462.45	52.64	66.780			
9,100.00	5,266.99	6,380.06	5,274.48	119.39	25.03	93.09	193.30	143.81	3,613.42	3,560.52	52.90	68.308			
9,200.00	5,267.15	6,393.27	5,274.25	122.35	25.09	93.01	180.11	144.27	3,711.78	3,658.57	53.22	69.748			
9,300.00	5,267.31	6,406.28	5,273.99	125.32	25.14	92.93	167.10	144.70	3,810.17	3,756.64	53.53	71.173			
9,400.00	5,267.47	6,419.11	5,273.70	128.29	25.20	92.85	154.29	145.10	3,908.58	3,854.73	53.85	72.582			
9,500.00	5,267.63	6,430.00	5,273.43	131.26	25.24	92.79	143.40	145.44	4,007.02	3,952.89	54.12	74.036			
9,600.00	5,267.79	6,430.00	5,273.43	134.24	25.24	92.79	143.40	145.44	4,105.51	4,051.38	54.12	75.855			
9,700.00	5,267.95	6,450.40	5,272.88	137.21	25.34	92.66	123.02	146.01	4,203.98	4,149.33	54.65	76.925			
9,800.00	5,268.11	6,459.62	5,272.62	140.19	25.38	92.61	113.81	146.24	4,302.51	4,247.61	54.89	78.380			
9,900.00	5,268.28	6,468.64	5,272.36	143.16	25.43	92.56	104.79	146.45	4,401.07	4,345.93	55.13	79.828			
10,000.00	5,268.44	6,491.00	5,271.68	146.14	25.54	92.43	82.44	146.90	4,499.69	4,443.97	55.73	80.748			
10,100.00	5,268.60	6,491.00	5,271.68	149.12	25.54	92.43	82.44	146.90	4,598.28	4,542.55	55.73	82.510			
10,200.00	5,268.76	6,508.13	5,271.13	152.10	25.63	92.34	65.33	147.22	4,696.91	4,640.71	56.20	83.571			
10,300.00	5,268.92	6,549.97	5,269.74	155.09	25.86	92.12	23.52	148.16	4,795.48	4,738.12	57.37	83.595			
10,350.70	5,269.00	6,552.00	5,269.67	156.60	25.87	92.11	21.49	148.21	4,845.44	4,788.01	57.43	84.377			

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 2H - Slot 2H
Project:	San Juan, NM NAD83	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Reference Site:	Heros 2308-09L	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Heros 2308-09L 2H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #6	Offset TVD Reference:	Offset Datum

Offset Design Heros 2308-09L - Heros 2308-09L 3H - OH - Plan #6													Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside		Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Toolface (°)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)			
0.00	0.00	0.00	0.00	0.00	0.00	91.99		-1.04	30.00	30.02				
100.00	100.00	100.00	100.00	0.13	0.13	91.99		-1.04	30.00	30.02	29.75	0.27	111.647	
200.00	200.00	200.00	200.00	0.49	0.49	91.99		-1.04	30.00	30.02	29.03	0.99	30.449	
300.00	300.00	300.00	300.00	0.85	0.85	91.99		-1.04	30.00	30.02	28.31	1.70	17.628	
400.00	400.00	400.00	400.00	1.21	1.21	91.99		-1.04	30.00	30.02	27.60	2.42	12.405	
500.00	500.00	500.00	500.00	1.57	1.57	91.99		-1.04	30.00	30.02	26.88	3.14	9.570 CC	
600.00	599.98	599.98	599.98	1.93	1.93	115.58		-1.04	30.00	30.73	26.88	3.85	7.976 ES	
700.00	699.84	699.84	699.84	2.29	2.28	123.67		-1.04	30.00	33.33	28.76	4.57	7.294	
800.00	799.45	799.45	799.45	2.65	2.64	134.33		-1.04	30.00	38.85	33.56	5.29	7.347	
900.00	898.70	898.70	898.70	3.02	3.00	144.62		-1.04	30.00	48.18	42.17	6.01	8.017	
1,000.00	997.47	997.47	997.47	3.40	3.35	152.92		-1.04	30.00	61.63	54.90	6.73	9.156	
1,100.00	1,095.62	1,095.62	1,095.62	3.79	3.70	159.08		-1.04	30.00	79.14	71.69	7.45	10.619	
1,200.00	1,193.12	1,193.12	1,193.12	4.21	4.05	163.54		-1.04	30.00	100.26	92.08	8.17	12.265	
1,300.00	1,290.48	1,294.33	1,294.32	4.64	4.41	166.86		-0.03	28.83	120.92	112.00	8.91	13.566	
1,400.00	1,387.84	1,397.04	1,396.88	5.08	4.78	169.68		3.39	24.88	138.52	128.85	9.67	14.321	
1,500.00	1,485.20	1,500.75	1,500.20	5.52	5.15	172.35		9.29	18.08	153.03	142.59	10.45	14.649	
1,600.00	1,582.57	1,603.67	1,602.35	5.97	5.52	175.01		17.47	8.64	164.61	153.40	11.21	14.682	
1,700.00	1,679.93	1,702.81	1,700.65	6.43	5.88	177.36		25.96	-1.16	175.63	163.69	11.94	14.707	
1,800.00	1,777.29	1,801.96	1,798.94	6.88	6.25	179.43		34.46	-10.97	186.90	174.23	12.68	14.743	
1,900.00	1,874.65	1,901.11	1,897.24	7.34	6.62	-178.74		42.96	-20.77	198.39	184.97	13.42	14.784	
2,000.00	1,972.01	2,000.26	1,995.53	7.80	7.00	-177.11		51.46	-30.58	210.06	195.89	14.17	14.829	
2,100.00	2,069.37	2,099.41	2,093.83	8.27	7.38	-175.65		59.96	-40.38	221.88	206.96	14.92	14.874	
2,200.00	2,166.73	2,198.56	2,192.12	8.73	7.76	-174.34		68.45	-50.19	233.82	218.15	15.67	14.919	
2,300.00	2,264.09	2,297.71	2,290.42	9.20	8.14	-173.15		76.95	-60.00	245.88	229.44	16.43	14.963	
2,400.00	2,361.45	2,396.85	2,388.72	9.67	8.52	-172.08		85.45	-69.80	258.03	240.83	17.20	15.005	
2,500.00	2,458.81	2,496.00	2,487.01	10.14	8.90	-171.11		93.95	-79.61	270.26	252.29	17.96	15.046	
2,600.00	2,556.17	2,595.15	2,585.31	10.61	9.29	-170.21		102.45	-89.41	282.56	263.83	18.73	15.085	
2,700.00	2,653.53	2,694.30	2,683.60	11.08	9.68	-169.40		110.94	-99.22	294.92	275.42	19.50	15.122	
2,800.00	2,750.90	2,793.45	2,781.90	11.55	10.06	-168.65		119.44	-109.02	307.34	287.06	20.28	15.158	
2,900.00	2,848.26	2,892.60	2,880.20	12.02	10.45	-167.95		127.94	-118.83	319.80	298.75	21.05	15.191	
3,000.00	2,945.62	2,991.75	2,978.49	12.49	10.84	-167.31		136.44	-128.63	332.31	310.48	21.83	15.223	
3,100.00	3,042.98	3,090.90	3,076.79	12.96	11.23	-166.72		144.94	-138.44	344.85	322.25	22.61	15.253	
3,200.00	3,140.34	3,190.04	3,175.08	13.43	11.62	-166.16		153.43	-148.25	357.43	334.04	23.39	15.282	
3,300.00	3,237.70	3,289.19	3,273.38	13.91	12.01	-165.65		161.93	-158.05	370.05	345.87	24.17	15.309	
3,400.00	3,335.06	3,388.34	3,371.68	14.38	12.40	-165.17		170.43	-167.86	382.68	357.73	24.96	15.334	
3,500.00	3,432.42	3,487.49	3,469.97	14.85	12.79	-164.72		178.93	-177.66	395.35	369.61	25.74	15.359	
3,600.00	3,529.78	3,586.64	3,568.27	15.33	13.18	-164.30		187.43	-187.47	408.03	381.50	26.53	15.382	
3,700.00	3,627.14	3,685.79	3,666.56	15.80	13.58	-163.90		195.93	-197.27	420.74	393.42	27.31	15.404	
3,800.00	3,724.50	3,784.94	3,764.86	16.28	13.97	-163.52		204.42	-207.08	433.46	405.36	28.10	15.425	
3,900.00	3,821.87	3,884.08	3,863.15	16.75	14.36	-163.17		212.92	-216.88	446.20	417.31	28.89	15.445	
4,000.00	3,919.23	3,983.23	3,961.45	17.23	14.76	-162.84		221.42	-226.69	458.96	429.28	29.68	15.464	
4,100.00	4,016.59	4,082.38	4,059.75	17.70	15.15	-162.52		229.92	-236.50	471.73	441.26	30.47	15.482	
4,200.00	4,113.95	4,181.53	4,158.04	18.18	15.54	-162.23		238.42	-246.30	484.52	453.26	31.26	15.500	
4,300.00	4,211.31	4,280.68	4,256.34	18.65	15.94	-161.94		246.91	-256.11	497.31	465.26	32.05	15.516	
4,400.00	4,308.73	4,379.17	4,353.99	19.12	16.33	-161.70		255.35	-265.84	509.89	477.05	32.84	15.527	
4,500.00	4,406.73	4,463.56	4,437.87	19.57	16.65	-161.66		261.53	-272.39	521.20	487.70	33.49	15.561	
4,600.00	4,505.40	4,543.18	4,517.39	19.98	16.92	162.08		264.86	-271.43	532.95	498.94	34.01	15.671	
4,700.00	4,603.84	4,622.25	4,595.93	20.33	17.16	123.64		265.56	-262.70	545.78	511.36	34.43	15.854	
4,800.00	4,700.37	4,700.00	4,671.95	20.61	17.36	105.88		263.70	-246.66	559.48	524.71	34.77	16.089	
4,900.00	4,793.34	4,779.35	4,747.47	20.85	17.56	97.26		259.22	-222.84	573.84	538.72	35.12	16.337	
5,000.00	4,881.17	4,857.73	4,819.23	21.04	17.76	92.43		252.29	-192.17	588.69	553.19	35.50	16.583	

CC - Min centre to center distance or covergent point, SF - min separation factor, ES - min ellipse separation



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 2H - Slot 2H
Project:	San Juan, NM NAD83	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Reference Site:	Heros 2308-09L	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Heros 2308-09L 2H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #6	Offset TVD Reference:	Offset Datum

Offset Design Heros 2308-09L - Heros 2308-09L 3H - OH - Plan #6														Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM														Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside		Offset Wellbore Centre		Distance		Minimum		Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Toolface (°)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Separation (usft)	Factor		
5,100.00	4,962.35	4,936.25	4,887.53	21.20	17.97	89.51		242.92	-154.65	603.89	567.90	35.99	16.781		
5,200.00	5,035.49	5,015.12	4,951.79	21.33	18.22	87.70		231.15	-110.52	619.29	582.61	36.68	16.883		
5,300.00	5,099.34	5,094.58	5,011.43	21.44	18.55	86.62		217.05	-80.01	634.80	597.11	37.69	16.845		
5,400.00	5,152.81	5,174.88	5,065.86	21.60	19.00	86.10		200.65	-3.34	650.32	611.21	39.10	16.631		
5,500.00	5,194.93	5,256.22	5,114.39	22.28	19.61	86.09		182.03	59.18	666.16	625.16	40.99	16.251		
5,600.00	5,224.94	5,354.18	5,163.29	23.69	20.59	86.64		157.84	140.45	681.98	638.34	43.65	15.625		
5,700.00	5,242.33	5,478.83	5,209.85	25.43	22.27	87.86		130.05	252.54	693.69	646.35	47.34	14.652		
5,800.00	5,250.03	5,610.17	5,238.75	27.39	24.51	89.24		106.04	378.21	700.18	648.47	51.71	13.541		
5,900.00	5,257.14	5,735.03	5,246.78	29.52	27.00	89.18		88.73	501.50	702.06	645.73	56.33	12.463		
6,000.00	5,262.01	5,827.52	5,248.41	31.79	28.99	88.89		77.17	593.25	701.83	641.27	60.56	11.589		
6,023.84	5,262.04	5,843.75	5,248.66	32.36	29.35	88.91		74.97	609.33	701.62	640.13	61.49	11.410		
6,100.00	5,262.17	5,863.25	5,248.98	34.16	30.26	88.93		68.19	648.24	703.60	639.50	64.10	10.977		
6,200.00	5,262.33	5,968.89	5,248.94	36.62	32.29	88.92		49.77	731.87	710.52	642.03	68.49	10.374		
6,300.00	5,262.49	6,068.63	5,248.85	39.15	34.73	88.91		28.15	829.24	717.74	644.30	73.44	9.773		
6,400.00	5,262.65	6,168.37	5,248.76	41.75	37.25	88.91		6.53	926.60	724.95	646.41	78.54	9.231		
6,500.00	5,262.81	6,268.11	5,248.67	44.40	39.84	88.90		-15.10	1,023.97	732.16	648.41	83.76	8.742		
6,600.00	5,262.97	6,367.85	5,248.58	47.09	42.48	88.89		-36.72	1,121.34	739.38	650.30	89.07	8.301		
6,700.00	5,263.13	6,467.59	5,248.49	49.82	45.17	88.88		-58.35	1,218.71	746.59	652.12	94.47	7.903		
6,800.00	5,263.29	6,567.33	5,248.40	52.57	47.89	88.87		-79.97	1,316.07	753.80	653.87	99.94	7.543		
6,900.00	5,263.45	6,667.07	5,248.31	55.36	50.64	88.86		-101.59	1,413.44	761.02	655.55	105.46	7.216		
7,000.00	5,263.61	6,766.81	5,248.22	58.16	53.42	88.86		-123.22	1,510.81	768.23	657.19	111.04	6.919		
7,100.00	5,263.77	6,866.55	5,248.13	60.99	56.23	88.85		-144.84	1,608.17	775.44	658.79	116.65	6.647		
7,200.00	5,263.94	6,966.29	5,248.04	63.83	59.05	88.84		-166.47	1,705.54	782.66	660.35	122.30	6.399		
7,300.00	5,264.10	7,066.02	5,247.95	66.69	61.89	88.83		-188.09	1,802.91	789.87	661.88	127.99	6.171		
7,400.00	5,264.26	7,165.76	5,247.86	69.56	64.74	88.82		-209.71	1,900.28	797.08	663.38	133.70	5.962		
7,500.00	5,264.42	7,265.50	5,247.77	72.44	67.60	88.82		-231.34	1,997.64	804.30	664.86	139.43	5.768		
7,600.00	5,264.58	7,365.24	5,247.68	75.33	70.48	88.81		-252.96	2,095.01	811.51	666.32	145.19	5.589		
7,700.00	5,264.74	7,464.98	5,247.59	78.23	73.36	88.80		-274.59	2,192.38	818.72	667.76	150.97	5.423		
7,800.00	5,264.90	7,564.72	5,247.50	81.13	76.26	88.80		-296.21	2,289.74	825.94	669.18	156.76	5.269		
7,900.00	5,265.06	7,664.46	5,247.41	84.05	79.16	88.79		-317.83	2,387.11	833.15	670.59	162.56	5.125		
8,000.00	5,265.22	7,764.20	5,247.32	86.97	82.07	88.78		-339.46	2,484.48	840.37	671.98	168.38	4.991		
8,100.00	5,265.38	7,863.94	5,247.23	89.90	84.98	88.78		-361.08	2,581.85	847.58	673.36	174.22	4.865		
8,200.00	5,265.54	7,963.68	5,247.14	92.83	87.90	88.77		-382.71	2,679.21	854.79	674.73	180.06	4.747		
8,300.00	5,265.70	8,063.42	5,247.05	95.76	90.83	88.76		-404.33	2,776.58	862.01	676.10	185.91	4.637		
8,400.00	5,265.86	8,163.16	5,246.96	98.71	93.76	88.76		-425.95	2,873.95	869.22	677.45	191.77	4.533		
8,500.00	5,266.03	8,262.90	5,246.87	101.65	96.69	88.75		-447.58	2,971.31	876.43	678.79	197.64	4.434		
8,600.00	5,266.19	8,362.64	5,246.78	104.60	99.63	88.74		-469.20	3,068.68	883.65	680.13	203.52	4.342		
8,700.00	5,266.35	8,462.38	5,246.69	107.55	102.57	88.74		-490.83	3,166.05	890.86	681.46	209.40	4.254		
8,800.00	5,266.51	8,562.12	5,246.60	110.51	105.52	88.73		-512.45	3,263.41	898.07	682.78	215.29	4.171		
8,900.00	5,266.67	8,661.86	5,246.51	113.46	108.46	88.73		-534.07	3,360.78	905.29	684.10	221.19	4.093		
9,000.00	5,266.83	8,761.60	5,246.42	116.43	111.41	88.72		-555.70	3,458.15	912.50	685.41	227.09	4.018		
9,100.00	5,266.99	8,861.33	5,246.33	119.39	114.36	88.72		-577.32	3,555.52	919.72	686.72	232.99	3.947		
9,200.00	5,267.15	8,961.07	5,246.24	122.35	117.32	88.71		-598.95	3,652.88	926.93	688.03	238.90	3.880		
9,300.00	5,267.31	9,060.81	5,246.15	125.32	120.28	88.71		-620.57	3,750.25	934.14	689.32	244.82	3.816		
9,400.00	5,267.47	9,160.55	5,246.06	128.29	123.23	88.70		-642.19	3,847.62	941.36	690.62	250.74	3.754		
9,500.00	5,267.63	9,260.29	5,245.97	131.26	126.19	88.69		-663.82	3,944.98	948.57	691.91	256.66	3.696		
9,600.00	5,267.79	9,360.03	5,245.88	134.24	129.16	88.69		-685.44	4,042.35	955.78	693.20	262.58	3.640		
9,700.00	5,267.95	9,459.77	5,245.79	137.21	132.12	88.68		-707.07	4,139.72	963.00	694.49	268.51	3.586		
9,800.00	5,268.11	9,559.51	5,245.70	140.19	135.08	88.68		-728.69	4,237.09	970.21	695.77	274.44	3.535		
9,900.00	5,268.28	9,659.25	5,245.61	143.16	138.05	88.67		-750.31	4,334.45	977.43	697.05	280.38	3.486		

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 2H - Slot 2H
Project:	San Juan, NM NAD83	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Reference Site:	Heros 2308-09L	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Heros 2308-09L 2H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #6	Offset TVD Reference:	Offset Datum

Offset Design Heros 2308-09L - Heros 2308-09L 3H - OH - Plan #6													Offset Site Error: 0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error: 0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)			
10,000.00	5,268.44	9,758.99	5,245.52	146.14	141.02	88.67	-771.94	4,431.82	984.64	698.32	286.31	3.439	
10,100.00	5,268.60	9,858.73	5,245.43	149.12	143.99	88.66	-793.56	4,529.19	991.85	699.60	292.25	3.394	
10,200.00	5,268.76	9,958.47	5,245.34	152.10	146.96	88.66	-815.19	4,626.55	999.07	700.87	298.19	3.350	
10,300.00	5,268.92	10,058.21	5,245.25	155.09	149.93	88.66	-836.81	4,723.92	1,006.28	702.14	304.14	3.309	
10,350.70	5,269.00	10,108.77	5,245.21	156.60	151.43	88.65	-847.77	4,773.28	1,009.94	702.79	307.15	3.288 SF	



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 2H - Slot 2H
Project:	San Juan, NM NAD83	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Reference Site:	Heros 2308-09L	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Heros 2308-09L 2H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #6	Offset TVD Reference:	Offset Datum

Offset Design Heros 2308-09L - Heros 2308-09L 4H - OH - Plan #6													Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre +N/-S (usft)	Centre +E/-W (usft)	Distance		Minimum Separation (usft)	Separation Factor	Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)				Between Centres (usft)	Between Ellipses (usft)				
0.00	0.00	0.00	0.00	0.00	0.00	90.08	-0.09	60.00	60.00					
100.00	100.00	100.00	100.00	0.13	0.13	90.08	-0.09	60.00	60.00	59.73	0.27	223.169		
200.00	200.00	200.00	200.00	0.49	0.49	90.08	-0.09	60.00	60.00	59.01	0.99	60.864		
300.00	300.00	300.00	300.00	0.85	0.85	90.08	-0.09	60.00	60.00	58.30	1.70	35.237		
400.00	400.00	400.00	400.00	1.21	1.21	90.08	-0.09	60.00	60.00	57.58	2.42	24.797		
500.00	500.00	500.00	500.00	1.57	1.57	90.08	-0.09	60.00	60.00	56.86	3.14	19.129 CC		
600.00	599.98	599.98	599.98	1.93	1.93	112.21	-0.09	60.00	60.64	56.79	3.85	15.740 ES		
700.00	699.84	699.84	699.84	2.29	2.28	116.59	-0.09	60.00	62.80	58.24	4.57	13.747		
800.00	799.45	799.45	799.45	2.65	2.64	123.16	-0.09	60.00	67.17	61.88	5.29	12.704		
900.00	898.70	898.70	898.70	3.02	3.00	130.88	-0.09	60.00	74.56	68.55	6.01	12.408 SF		
1,000.00	997.47	997.47	997.47	3.40	3.35	138.62	-0.09	60.00	85.66	78.93	6.73	12.722		
1,100.00	1,095.62	1,095.62	1,095.62	3.79	3.70	145.59	-0.09	60.00	100.86	93.40	7.46	13.521		
1,200.00	1,193.12	1,193.12	1,193.12	4.21	4.05	151.46	-0.09	60.00	119.95	111.77	8.18	14.656		
1,300.00	1,290.48	1,289.01	1,289.00	4.64	4.38	156.37	-1.32	59.38	141.00	132.12	8.88	15.883		
1,400.00	1,387.84	1,383.62	1,383.49	5.08	4.70	161.01	-5.35	57.37	164.11	154.56	9.55	17.184		
1,500.00	1,485.20	1,476.83	1,476.40	5.52	5.01	165.31	-12.04	54.02	189.52	179.31	10.22	18.550		
1,600.00	1,582.57	1,568.49	1,567.48	5.97	5.32	169.25	-21.25	49.42	217.41	206.53	10.88	19.985		
1,700.00	1,679.93	1,658.46	1,656.50	6.43	5.63	172.84	-32.83	43.63	247.86	236.33	11.54	21.488		
1,800.00	1,777.29	1,746.60	1,743.29	6.88	5.95	176.08	-46.59	36.75	280.94	268.75	12.18	23.057		
1,900.00	1,874.65	1,832.82	1,827.68	7.34	6.27	179.01	-62.35	28.87	316.64	303.81	12.82	24.692		
2,000.00	1,972.01	1,917.01	1,909.55	7.80	6.59	-178.36	-79.92	20.08	354.94	341.49	13.45	26.390		
2,100.00	2,069.37	2,004.42	1,994.04	8.27	6.95	-175.91	-99.95	10.07	395.42	381.31	14.10	28.035		
2,200.00	2,166.73	2,094.49	2,081.06	8.73	7.33	-173.82	-120.72	-0.32	436.57	421.78	14.79	29.525		
2,300.00	2,264.09	2,184.55	2,168.08	9.20	7.71	-172.09	-141.50	-10.70	478.12	462.65	15.47	30.897		
2,400.00	2,361.45	2,274.62	2,255.10	9.67	8.11	-170.63	-162.27	-21.09	519.99	503.82	16.17	32.159		
2,500.00	2,458.81	2,364.68	2,342.12	10.14	8.51	-169.39	-183.04	-31.48	562.10	545.23	16.87	33.322		
2,600.00	2,556.17	2,454.75	2,429.14	10.61	8.92	-168.31	-203.82	-41.87	604.39	586.82	17.57	34.394		
2,700.00	2,653.53	2,544.82	2,516.16	11.08	9.34	-167.38	-224.59	-52.25	646.84	628.56	18.28	35.385		
2,800.00	2,750.90	2,634.88	2,603.18	11.55	9.76	-166.56	-245.37	-62.64	689.42	670.43	18.99	36.302		
2,900.00	2,848.26	2,724.95	2,690.20	12.02	10.18	-165.84	-266.14	-73.03	732.10	712.39	19.71	37.153		
3,000.00	2,945.62	2,815.02	2,777.22	12.49	10.60	-165.19	-286.91	-83.41	774.86	754.44	20.42	37.943		
3,100.00	3,042.98	2,905.08	2,864.24	12.96	11.03	-164.61	-307.69	-93.80	817.70	796.56	21.14	38.678		
3,200.00	3,140.34	2,995.15	2,951.26	13.43	11.47	-164.09	-328.46	-104.19	860.60	838.74	21.86	39.364		
3,300.00	3,237.70	3,085.21	3,038.28	13.91	11.90	-163.62	-349.24	-114.57	903.55	880.96	22.59	40.004		
3,400.00	3,335.06	3,175.28	3,125.30	14.38	12.34	-163.19	-370.01	-124.96	946.55	923.24	23.31	40.604		
3,500.00	3,432.42	3,265.35	3,212.32	14.85	12.78	-162.80	-390.79	-135.35	989.59	965.55	24.04	41.166		
3,600.00	3,529.78	3,355.41	3,299.34	15.33	13.22	-162.44	-411.56	-145.74	1,032.66	1,007.89	24.77	41.695		
3,700.00	3,627.14	3,445.48	3,386.36	15.80	13.66	-162.11	-432.33	-156.12	1,075.76	1,050.26	25.50	42.192		
3,800.00	3,724.50	3,535.54	3,473.38	16.28	14.11	-161.80	-453.11	-166.51	1,118.89	1,092.66	26.23	42.660		
3,900.00	3,821.87	3,625.61	3,560.40	16.75	14.56	-161.52	-473.88	-176.90	1,162.04	1,135.08	26.96	43.102		
4,000.00	3,919.23	3,715.68	3,647.42	17.23	15.00	-161.26	-494.66	-187.28	1,205.22	1,177.52	27.69	43.520		
4,100.00	4,016.59	3,805.74	3,734.44	17.70	15.45	-161.01	-515.43	-197.67	1,248.41	1,219.98	28.43	43.915		
4,200.00	4,113.95	3,895.81	3,821.46	18.18	15.90	-160.78	-536.20	-208.06	1,291.62	1,262.46	29.16	44.290		
4,300.00	4,211.31	3,985.87	3,908.48	18.65	16.35	-160.57	-556.98	-218.44	1,334.85	1,304.95	29.90	44.645		
4,400.00	4,308.73	4,076.04	3,995.59	19.12	16.80	-160.48	-577.78	-228.84	1,377.88	1,347.25	30.64	44.977		
4,500.00	4,406.73	4,167.25	4,083.72	19.57	17.26	-160.55	-598.82	-239.36	1,418.52	1,387.15	31.37	45.218		
4,600.00	4,505.40	4,259.20	4,172.56	19.98	17.72	162.16	-620.02	-249.97	1,456.43	1,424.34	32.09	45.387		
4,700.00	4,603.84	4,355.30	4,265.42	20.33	18.21	122.82	-642.17	-261.04	1,492.07	1,459.26	32.81	45.479		
4,800.00	4,700.37	4,429.92	4,337.76	20.61	18.57	104.25	-658.91	-268.30	1,524.91	1,491.62	33.29	45.806		
4,900.00	4,793.34	4,478.74	4,384.99	20.85	18.81	94.45	-671.11	-269.89	1,557.43	1,523.92	33.51	46.479		
5,000.00	4,881.17	4,526.97	4,431.35	21.04	19.03	88.42	-684.33	-268.64	1,589.49	1,555.76	33.73	47.119		

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 2H - Slot 2H
Project:	San Juan, NM NAD83	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Reference Site:	Heros 2308-09L	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Heros 2308-09L 2H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #6	Offset TVD Reference:	Offset Datum

Offset Design Heros 2308-09L - Heros 2308-09L 4H - OH - Plan #6													Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Minimum Separation (usft)	Separation Factor	Warning			
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)						
5,100.00	4,962.35	4,574.69	4,476.74	21.20	19.25	84.26	-698.52	-264.66	1,620.85	1,586.83	34.03	47.637		
5,200.00	5,035.49	4,622.00	4,521.07	21.33	19.45	81.20	-713.60	-258.04	1,651.28	1,616.83	34.45	47.928		
5,300.00	5,099.34	4,668.99	4,564.30	21.44	19.65	78.88	-729.55	-248.84	1,680.61	1,645.51	35.10	47.886		
5,400.00	5,152.81	4,715.78	4,606.38	21.60	19.85	77.13	-746.31	-237.14	1,708.69	1,672.67	36.02	47.437		
5,500.00	5,194.93	4,762.36	4,647.16	22.28	20.03	75.89	-763.81	-222.99	1,735.79	1,698.52	37.27	46.577		
5,600.00	5,224.94	4,808.77	4,686.52	23.69	20.21	74.91	-781.98	-206.49	1,762.03	1,723.19	38.84	45.369		
5,700.00	5,242.33	4,855.12	4,724.45	25.43	20.39	74.18	-800.82	-187.65	1,787.33	1,746.64	40.70	43.920		
5,800.00	5,250.03	4,903.60	4,762.48	27.39	20.57	74.93	-821.16	-165.51	1,812.82	1,770.04	42.79	42.370		
5,900.00	5,257.14	4,961.10	4,805.19	29.52	20.79	76.38	-846.03	-136.15	1,841.51	1,796.41	45.09	40.837		
6,000.00	5,262.01	5,028.91	4,851.92	31.79	21.05	76.81	-876.22	-97.42	1,871.68	1,824.04	47.64	39.288		
6,100.00	5,262.17	5,108.42	4,901.22	34.16	21.38	78.53	-912.48	-46.73	1,901.41	1,850.93	50.49	37.662		
6,200.00	5,262.33	5,205.09	4,952.46	36.62	21.88	80.31	-957.30	21.81	1,932.52	1,878.76	53.76	35.950		
6,300.00	5,262.49	5,300.59	4,994.22	39.15	22.58	81.74	-1,001.75	95.28	1,964.10	1,906.81	57.29	34.281		
6,400.00	5,262.65	5,384.36	5,029.67	41.75	23.42	82.93	-1,040.73	160.40	1,996.57	1,935.74	60.83	32.823		
6,500.00	5,262.81	5,468.12	5,065.12	44.40	24.47	84.09	-1,079.70	225.53	2,029.99	1,965.47	64.51	31.466		
6,600.00	5,262.97	5,551.89	5,100.58	47.09	25.69	85.22	-1,118.67	290.65	2,064.31	1,996.00	68.31	30.219		
6,700.00	5,263.13	5,635.66	5,136.03	49.82	27.04	86.32	-1,157.65	355.77	2,099.49	2,027.29	72.21	29.076		
6,800.00	5,263.29	5,713.96	5,169.17	52.57	28.38	87.32	-1,194.08	416.65	2,135.50	2,059.47	76.03	28.087		
6,900.00	5,263.45	5,768.95	5,190.66	55.36	29.40	87.96	-1,220.38	459.87	2,172.98	2,093.65	79.32	27.394		
7,000.00	5,263.61	5,822.75	5,208.18	58.16	30.45	88.47	-1,247.44	502.95	2,212.29	2,129.68	82.61	26.780		
7,100.00	5,263.77	5,878.24	5,222.51	60.99	31.60	88.89	-1,276.54	547.94	2,253.24	2,167.27	85.97	26.209		
7,200.00	5,263.94	5,934.87	5,233.15	63.83	32.82	89.19	-1,307.37	594.22	2,295.66	2,206.27	89.39	25.681		
7,300.00	5,264.10	6,000.00	5,240.34	66.69	34.27	89.40	-1,343.99	647.58	2,339.44	2,246.33	93.11	25.125		
7,400.00	5,264.26	6,050.00	5,242.16	69.56	35.41	89.45	-1,372.80	688.39	2,384.42	2,288.10	96.32	24.755		
7,500.00	5,264.42	6,126.56	5,240.82	72.44	37.18	89.42	-1,417.53	750.52	2,430.38	2,329.91	100.46	24.191		
7,600.00	5,264.58	6,215.32	5,238.98	75.33	39.28	89.38	-1,469.42	822.50	2,476.41	2,371.32	105.09	23.565		
7,700.00	5,264.74	6,304.08	5,237.15	78.23	41.41	89.34	-1,521.31	894.49	2,522.45	2,412.68	109.76	22.980		
7,800.00	5,264.90	6,392.85	5,235.32	81.13	43.59	89.30	-1,573.20	966.48	2,568.49	2,454.00	114.49	22.435		
7,900.00	5,265.06	6,481.61	5,233.49	84.05	45.79	89.27	-1,625.09	1,038.47	2,614.52	2,495.28	119.24	21.926		
8,000.00	5,265.22	6,570.37	5,231.65	86.97	48.01	89.23	-1,676.98	1,110.46	2,660.56	2,536.53	124.03	21.450		
8,100.00	5,265.38	6,659.13	5,229.82	89.90	50.26	89.20	-1,728.88	1,182.45	2,706.60	2,577.75	128.85	21.005		
8,200.00	5,265.54	6,747.89	5,227.99	92.83	52.53	89.17	-1,780.77	1,254.44	2,752.64	2,618.94	133.70	20.589		
8,300.00	5,265.70	6,836.65	5,226.16	95.76	54.81	89.14	-1,832.66	1,326.43	2,798.68	2,660.12	138.56	20.198		
8,400.00	5,265.86	6,925.41	5,224.32	98.71	57.11	89.11	-1,884.55	1,398.41	2,844.72	2,701.27	143.45	19.831		
8,500.00	5,266.03	7,014.17	5,222.49	101.65	59.42	89.08	-1,936.44	1,470.40	2,890.76	2,742.41	148.35	19.486		
8,600.00	5,266.19	7,102.93	5,220.66	104.60	61.74	89.05	-1,988.33	1,542.39	2,936.80	2,783.53	153.27	19.161		
8,700.00	5,266.35	7,191.69	5,218.83	107.55	64.07	89.02	-2,040.22	1,614.38	2,982.85	2,824.64	158.21	18.854		
8,800.00	5,266.51	7,280.45	5,216.99	110.51	66.41	88.99	-2,092.12	1,686.37	3,028.89	2,865.74	163.15	18.565		
8,900.00	5,266.67	7,369.21	5,215.16	113.46	68.76	88.97	-2,144.01	1,758.36	3,074.93	2,906.82	168.11	18.291		
9,000.00	5,266.83	7,457.97	5,213.33	116.43	71.12	88.94	-2,195.90	1,830.35	3,120.98	2,947.90	173.08	18.032		
9,100.00	5,266.99	7,546.73	5,211.50	119.39	73.48	88.92	-2,247.79	1,902.34	3,167.02	2,988.96	178.06	17.787		
9,200.00	5,267.15	7,635.49	5,209.67	122.35	75.85	88.89	-2,299.68	1,974.33	3,213.07	3,030.02	183.04	17.554		
9,300.00	5,267.31	7,724.26	5,207.83	125.32	78.23	88.87	-2,351.57	2,046.31	3,259.11	3,071.07	188.04	17.332		
9,400.00	5,267.47	7,813.02	5,206.00	128.29	80.61	88.85	-2,403.46	2,118.30	3,305.16	3,112.12	193.04	17.122		
9,500.00	5,267.63	7,901.78	5,204.17	131.26	82.99	88.83	-2,455.35	2,190.29	3,351.20	3,153.16	198.05	16.921		
9,600.00	5,267.79	7,990.54	5,202.34	134.24	85.38	88.80	-2,507.25	2,262.28	3,397.25	3,194.19	203.06	16.730		
9,700.00	5,267.95	8,079.30	5,199.51	137.21	87.76	88.77	-2,559.14	2,334.27	3,443.30	3,235.24	208.07	16.540		
9,800.00	5,268.11	8,168.06	5,197.68	140.19	90.14	88.74	-2,611.03	2,406.26	3,489.35	3,276.29	213.08	16.350		
9,900.00	5,268.28	8,256.82	5,195.85	143.16	92.52	88.71	-2,662.92	2,478.25	3,535.40	3,317.34	218.09	16.160		
10,000.00	5,268.44	8,345.58	5,194.02	146.14	94.90	88.68	-2,714.81	2,550.24	3,581.45	3,358.39	223.10	15.970		

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 2H - Slot 2H
Project:	San Juan, NM NAD83	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Reference Site:	Heros 2308-09L	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Heros 2308-09L 2H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #6	Offset TVD Reference:	Offset Datum

Offset Design Heros 2308-09L - Heros 2308-09L 4H - OH - Plan #6													Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance				Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
10,100.00	5,268.60	9,298.33	5,190.59	149.12	121.80	88.72	-3,094.91	3,424.58	3,526.48	3,263.39	263.09	13.404		
10,200.00	5,268.76	9,395.53	5,190.33	152.10	124.57	88.72	-3,131.28	3,514.72	3,549.98	3,281.17	268.81	13.206		
10,300.00	5,268.92	9,492.73	5,190.08	155.09	127.33	88.72	-3,167.66	3,604.85	3,573.48	3,298.94	274.53	13.017		
10,350.70	5,269.00	9,542.01	5,189.95	156.60	128.74	88.72	-3,186.10	3,650.55	3,585.39	3,307.96	277.44	12.923		



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 2H - Slot 2H
Project:	San Juan, NM NAD83	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Reference Site:	Heros 2308-09L	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Heros 2308-09L 2H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #6	Offset TVD Reference:	Offset Datum

Offset Design Heros 2308-09L - Heros 2308-09L 5H - OH - Plan #2													Offset Site Error:	0.00 usft
Survey Program: O-MWD+HDGM													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Distance		Minimum Separation (usft)	Separation Factor	Warning			
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)						
0.00	0.00	0.00	0.00	0.00	0.00	90.08	-0.13	90.00	90.00					
100.00	100.00	100.00	100.00	0.13	0.13	90.08	-0.13	90.00	90.00	89.73	0.27	334.754		
200.00	200.00	200.00	200.00	0.49	0.49	90.08	-0.13	90.00	90.00	89.01	0.99	91.297		
300.00	300.00	300.00	300.00	0.85	0.85	90.08	-0.13	90.00	90.00	88.30	1.70	52.856		
400.00	400.00	400.00	400.00	1.21	1.21	90.08	-0.13	90.00	90.00	87.58	2.42	37.195		
500.00	500.00	500.00	500.00	1.57	1.57	90.08	-0.13	90.00	90.00	86.86	3.14	28.693 CC		
600.00	599.98	599.98	599.98	1.93	1.93	111.70	-0.13	90.00	90.63	86.78	3.85	23.525 ES		
700.00	699.84	699.84	699.84	2.29	2.28	114.66	-0.13	90.00	92.69	88.13	4.57	20.290		
800.00	799.45	799.45	799.45	2.65	2.64	119.28	-0.13	90.00	96.66	91.38	5.29	18.284		
900.00	898.70	898.70	898.70	3.02	3.00	125.06	-0.13	90.00	103.20	97.19	6.01	17.173		
1,000.00	997.47	997.47	997.47	3.40	3.35	131.37	-0.13	90.00	112.96	106.23	6.74	16.771		
1,100.00	1,095.62	1,095.62	1,095.62	3.79	3.70	137.63	-0.13	90.00	126.48	119.02	7.46	16.945		
1,200.00	1,193.12	1,193.12	1,193.12	4.21	4.05	143.43	-0.13	90.00	143.82	135.63	8.19	17.552		
1,300.00	1,290.48	1,294.21	1,294.19	4.64	4.41	148.74	-0.32	88.46	161.83	152.91	8.93	18.127		
1,400.00	1,387.84	1,395.73	1,395.58	5.08	4.75	153.84	-0.96	83.37	178.66	169.00	9.66	18.496		
1,500.00	1,485.20	1,497.15	1,496.61	5.52	5.11	158.89	-2.04	74.72	194.57	184.18	10.39	18.725		
1,600.00	1,582.57	1,598.12	1,596.84	5.97	5.47	163.96	-3.55	62.59	209.94	198.82	11.12	18.875		
1,700.00	1,679.93	1,695.29	1,693.08	6.43	5.82	168.52	-5.21	49.32	225.94	214.11	11.83	19.093		
1,800.00	1,777.29	1,792.46	1,789.32	6.88	6.18	172.48	-6.87	36.04	243.19	230.64	12.56	19.370		
1,900.00	1,874.65	1,889.62	1,885.56	7.34	6.54	175.91	-8.53	22.76	261.44	248.15	13.29	19.678		
2,000.00	1,972.01	1,986.79	1,981.80	7.80	6.91	178.90	-10.19	9.48	280.50	266.47	14.03	19.998		
2,100.00	2,069.37	2,083.95	2,078.04	8.27	7.28	-178.50	-11.85	-3.80	300.21	285.43	14.77	20.320		
2,200.00	2,166.73	2,181.12	2,174.28	8.73	7.65	-176.21	-13.51	-17.08	320.45	304.92	15.53	20.637		
2,300.00	2,264.09	2,278.28	2,270.52	9.20	8.03	-174.19	-15.17	-30.35	341.13	324.84	16.29	20.944		
2,400.00	2,361.45	2,375.45	2,366.76	9.67	8.41	-172.41	-16.83	-43.63	362.17	345.11	17.05	21.239		
2,500.00	2,458.81	2,472.61	2,463.00	10.14	8.79	-170.82	-18.49	-56.91	383.51	365.69	17.82	21.520		
2,600.00	2,556.17	2,569.78	2,559.24	10.61	9.17	-169.39	-20.15	-70.19	405.11	386.52	18.59	21.788		
2,700.00	2,653.53	2,666.94	2,655.48	11.08	9.55	-168.11	-21.81	-83.47	426.93	407.56	19.37	22.041		
2,800.00	2,750.90	2,764.11	2,751.72	11.55	9.94	-166.96	-23.47	-96.75	448.93	428.78	20.15	22.282		
2,900.00	2,848.26	2,861.27	2,847.96	12.02	10.32	-165.91	-25.13	-110.02	471.09	450.16	20.93	22.509		
3,000.00	2,945.62	2,958.44	2,944.20	12.49	10.71	-164.95	-26.79	-123.30	493.38	471.67	21.71	22.724		
3,100.00	3,042.98	3,055.60	3,040.44	12.96	11.10	-164.08	-28.45	-136.58	515.80	493.31	22.50	22.928		
3,200.00	3,140.34	3,152.77	3,136.68	13.43	11.48	-163.28	-30.11	-149.86	538.32	515.04	23.28	23.121		
3,300.00	3,237.70	3,249.94	3,232.91	13.91	11.87	-162.54	-31.77	-163.14	560.94	536.87	24.07	23.303		
3,400.00	3,335.06	3,347.10	3,329.15	14.38	12.26	-161.87	-33.43	-176.42	583.63	558.77	24.86	23.477		
3,500.00	3,432.42	3,444.27	3,425.39	14.85	12.65	-161.24	-35.09	-189.89	606.40	580.75	25.65	23.641		
3,600.00	3,529.78	3,541.43	3,521.63	15.33	13.04	-160.65	-36.75	-202.97	629.23	602.79	26.44	23.797		
3,700.00	3,627.14	3,638.60	3,617.87	15.80	13.44	-160.11	-38.41	-216.25	652.12	624.89	27.23	23.945		
3,800.00	3,724.50	3,735.76	3,714.11	16.28	13.83	-159.61	-40.07	-229.53	675.06	647.04	28.03	24.085		
3,900.00	3,821.87	3,832.93	3,810.35	16.75	14.22	-159.13	-41.73	-242.81	698.05	669.23	28.82	24.219		
4,000.00	3,919.23	3,930.09	3,908.59	17.23	14.61	-158.69	-43.39	-256.09	721.08	691.46	29.62	24.347		
4,100.00	4,016.59	4,027.26	4,002.83	17.70	15.00	-158.28	-45.05	-269.37	744.15	713.74	30.41	24.469		
4,200.00	4,113.95	4,124.42	4,099.07	18.18	15.40	-157.89	-46.71	-282.64	767.25	736.05	31.21	24.585		
4,300.00	4,211.31	4,221.59	4,195.31	18.65	15.79	-157.52	-48.37	-295.92	790.39	758.38	32.00	24.696		
4,400.00	4,308.73	4,320.49	4,293.31	19.12	16.19	-157.25	-50.03	-309.18	813.29	780.48	32.81	24.785		
4,500.00	4,406.73	4,391.74	4,364.23	19.57	16.46	-157.37	-52.22	-316.33	834.95	801.62	33.34	25.046		
4,600.00	4,505.40	4,460.07	4,432.38	19.98	16.68	165.82	-56.86	-315.55	857.33	823.59	33.74	25.412		
4,700.00	4,603.84	4,527.58	4,499.30	20.33	16.87	126.61	-63.86	-310.29	881.25	847.21	34.04	25.887		
4,800.00	4,700.37	4,600.00	4,570.03	20.61	17.06	108.04	-73.97	-298.65	906.37	872.03	34.35	26.388		
4,900.00	4,793.34	4,660.72	4,628.04	20.85	17.21	98.48	-84.46	-284.18	932.25	897.73	34.52	27.009		
5,000.00	4,881.17	4,726.69	4,689.28	21.04	17.37	92.73	-97.85	-263.69	958.62	923.84	34.77	27.569		

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 2H - Slot 2H
Project:	San Juan, NM NAD83	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Reference Site:	Heros 2308-09L	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Heros 2308-09L 2H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #6	Offset TVD Reference:	Offset Datum

Offset Design Heros 2308-09L - Heros 2308-09L 5H - OH - Plan #2														Offset Site Error:	0.00 usft
Survey Program: 0-MWD+HDGM														Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)					
5,100.00	4,962.35	4,792.53	4,748.09	21.20	17.52	88.87	-113.20	-238.44	985.16	950.04	35.12	28.051			
5,200.00	5,035.49	4,858.44	4,804.24	21.33	17.69	86.10	-130.43	-208.55	1,011.62	975.98	35.64	28.382			
5,300.00	5,099.34	4,924.70	4,857.48	21.44	17.87	84.08	-149.50	-174.08	1,037.77	1,001.34	36.43	28.488			
5,400.00	5,152.81	4,991.59	4,907.59	21.60	18.10	82.65	-170.39	-135.04	1,063.42	1,025.87	37.55	28.320			
5,500.00	5,194.93	5,059.32	4,954.21	22.28	18.41	81.74	-193.05	-91.48	1,088.80	1,049.72	39.07	27.866			
5,600.00	5,224.94	5,128.23	4,997.00	23.69	18.84	81.11	-217.49	-43.35	1,113.93	1,072.91	41.02	27.158			
5,700.00	5,242.33	5,200.00	5,036.23	25.43	19.42	80.79	-244.20	10.46	1,138.66	1,095.28	43.38	26.249			
5,800.00	5,250.03	5,272.41	5,069.94	27.39	20.18	81.87	-272.23	68.06	1,163.63	1,117.54	46.08	25.251			
5,900.00	5,257.14	5,350.00	5,099.17	29.52	21.17	83.24	-303.16	132.89	1,190.63	1,141.53	49.10	24.249			
6,000.00	5,262.01	5,440.10	5,125.15	31.79	22.57	83.35	-339.79	210.98	1,217.93	1,165.27	52.67	23.125			
6,100.00	5,262.17	5,532.23	5,150.50	34.16	24.16	84.69	-377.32	291.22	1,243.73	1,187.18	56.55	21.993			
6,200.00	5,262.33	5,624.37	5,175.86	36.62	25.89	85.97	-414.85	371.45	1,270.19	1,209.54	60.65	20.942			
6,300.00	5,262.49	5,716.50	5,201.22	39.15	27.75	87.21	-452.39	451.68	1,297.28	1,232.35	64.93	19.980			
6,400.00	5,262.65	5,809.93	5,226.82	41.75	29.73	88.41	-490.45	533.07	1,324.95	1,255.57	69.38	19.097			
6,500.00	5,262.81	5,916.43	5,247.20	44.40	32.15	89.34	-533.99	628.01	1,352.57	1,278.17	74.40	18.180			
6,600.00	5,262.97	6,025.75	5,252.94	47.09	34.77	89.59	-578.27	727.70	1,379.35	1,299.68	79.68	17.312			
6,700.00	5,263.13	6,122.21	5,252.39	49.82	37.16	89.57	-617.01	816.04	1,405.72	1,321.08	84.65	16.607			
6,800.00	5,263.29	6,218.67	5,251.84	52.57	39.60	89.55	-655.74	904.37	1,432.10	1,342.39	89.71	15.964			
6,900.00	5,263.45	6,315.13	5,251.29	55.36	42.09	89.53	-694.47	992.71	1,458.47	1,363.63	94.84	15.378			
7,000.00	5,263.61	6,411.59	5,250.74	58.16	44.62	89.51	-733.20	1,081.05	1,484.84	1,384.79	100.05	14.841			
7,100.00	5,263.77	6,508.05	5,250.20	60.99	47.19	89.49	-771.94	1,169.39	1,511.22	1,405.91	105.31	14.350			
7,200.00	5,263.94	6,604.50	5,249.65	63.83	49.78	89.47	-810.67	1,257.73	1,537.59	1,426.97	110.62	13.900			
7,300.00	5,264.10	6,700.96	5,249.10	66.69	52.40	89.46	-849.40	1,346.07	1,563.96	1,447.99	115.97	13.486			
7,400.00	5,264.26	6,797.42	5,248.55	69.56	55.04	89.44	-888.14	1,434.40	1,590.34	1,468.98	121.36	13.104			
7,500.00	5,264.42	6,893.88	5,248.00	72.44	57.70	89.42	-926.87	1,522.74	1,616.71	1,489.94	126.78	12.752			
7,600.00	5,264.58	6,990.34	5,247.45	75.33	60.37	89.41	-965.60	1,611.08	1,643.09	1,510.86	132.22	12.427			
7,700.00	5,264.74	7,086.80	5,246.90	78.23	63.06	89.39	-1,004.33	1,699.42	1,669.46	1,531.77	137.69	12.125			
7,800.00	5,264.90	7,183.25	5,246.35	81.13	65.76	89.38	-1,043.07	1,787.76	1,695.83	1,552.65	143.18	11.844			
7,900.00	5,265.06	7,279.71	5,245.80	84.05	68.47	89.36	-1,081.80	1,876.10	1,722.21	1,573.52	148.69	11.583			
8,000.00	5,265.22	7,376.17	5,245.25	86.97	71.19	89.35	-1,120.53	1,964.44	1,748.58	1,594.37	154.21	11.339			
8,100.00	5,265.38	7,472.63	5,244.71	89.90	73.92	89.33	-1,159.27	2,052.77	1,774.96	1,615.20	159.75	11.111			
8,200.00	5,265.54	7,569.09	5,244.16	92.83	76.66	89.32	-1,198.00	2,141.11	1,801.33	1,636.03	165.31	10.897			
8,300.00	5,265.70	7,665.55	5,243.61	95.76	79.40	89.31	-1,236.73	2,229.45	1,827.71	1,656.83	170.87	10.696			
8,400.00	5,265.86	7,762.00	5,243.06	98.71	82.15	89.29	-1,275.46	2,317.79	1,854.08	1,677.63	176.45	10.508			
8,500.00	5,266.03	7,858.46	5,242.51	101.65	84.90	89.28	-1,314.20	2,406.13	1,880.46	1,698.42	182.03	10.330			
8,600.00	5,266.19	7,954.92	5,241.96	104.60	87.66	89.27	-1,352.93	2,494.47	1,906.83	1,719.20	187.63	10.163			
8,700.00	5,266.35	8,051.38	5,241.41	107.55	90.43	89.26	-1,391.66	2,582.80	1,933.21	1,739.97	193.23	10.005			
8,800.00	5,266.51	8,147.84	5,240.86	110.51	93.20	89.25	-1,430.40	2,671.14	1,959.58	1,760.74	198.84	9.855			
8,900.00	5,266.67	8,244.30	5,240.32	113.46	95.97	89.24	-1,469.13	2,759.48	1,985.96	1,781.49	204.46	9.713			
9,000.00	5,266.83	8,340.76	5,239.77	116.43	98.74	89.23	-1,507.86	2,847.82	2,012.33	1,802.25	210.09	9.579			
9,100.00	5,266.99	8,437.21	5,239.22	119.39	101.52	89.22	-1,546.59	2,936.16	2,038.71	1,822.99	215.72	9.451			
9,200.00	5,267.15	8,533.67	5,238.67	122.35	104.30	89.21	-1,585.33	3,024.50	2,065.08	1,843.73	221.35	9.329			
9,300.00	5,267.31	8,630.13	5,238.12	125.32	107.09	89.20	-1,624.06	3,112.84	2,091.46	1,864.47	226.99	9.214			
9,400.00	5,267.47	8,726.59	5,237.57	128.29	109.87	89.19	-1,662.79	3,201.17	2,117.83	1,885.20	232.64	9.104			
9,500.00	5,267.63	8,823.05	5,237.02	131.26	112.66	89.18	-1,701.52	3,289.51	2,144.21	1,905.92	238.29	8.998			
9,600.00	5,267.79	8,919.51	5,236.47	134.24	115.45	89.17	-1,740.26	3,377.85	2,170.58	1,926.65	243.94	8.898			
9,700.00	5,267.95	9,015.96	5,235.92	137.21	118.24	89.16	-1,778.99	3,466.19	2,196.96	1,947.36	249.60	8.802			
9,800.00	5,268.11	9,112.42	5,235.38	140.19	121.04	89.15	-1,817.72	3,554.53	2,223.34	1,968.08	255.26	8.710			
9,900.00	5,268.28	9,208.88	5,234.83	143.16	123.83	89.14	-1,856.46	3,642.87	2,249.71	1,988.79	260.92	8.622			
10,000.00	5,268.44	9,305.34	5,234.28	146.14	126.63	89.13	-1,895.19	3,731.21	2,276.09	2,009.50	266.59	8.538			

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 2H - Slot 2H
Project:	San Juan, NM NAD83	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Reference Site:	Heros 2308-09L	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Heros 2308-09L 2H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #6	Offset TVD Reference:	Offset Datum

Offset Design Heros 2308-09L - Heros 2308-09L 5H - OH - Plan #2													Offset Site Error: 0.00 usft
Survey Program: 0-MWD+HDGM													Offset Well Error: 0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)			
10,100.00	5,268.60	9,401.80	5,233.73	149.12	129.43	89.13	-1,933.92	3,819.54	2,302.46	2,030.21	272.26	8.457	
10,200.00	5,268.76	9,498.26	5,233.18	152.10	132.23	89.12	-1,972.65	3,907.88	2,328.84	2,050.91	277.93	8.379	
10,300.00	5,268.92	9,594.71	5,232.63	155.09	135.03	89.11	-2,011.39	3,996.22	2,355.21	2,071.61	283.60	8.305	
10,350.70	5,269.00	9,643.61	5,232.35	156.60	136.46	89.11	-2,031.02	4,041.00	2,368.59	2,082.11	286.48	8.268 SF	



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 2H - Slot 2H
Project:	San Juan, NM NAD83	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Reference Site:	Heros 2308-09L	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Heros 2308-09L 2H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #6	Offset TVD Reference:	Offset Datum

Offset Design Heros 2308-09L - State NM 16 #21 Unit C - OH - OH													Offset Site Error:	0.00 usft
Survey Program: 313-INCLINOMETER													Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance				Warning	
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor		
0.00	0.00	0.00	0.00	0.00	0.00	142.21	-2,375.19	1,841.48	3,005.52					
100.00	100.00	75.00	75.00	0.13	1.14	142.21	-2,375.19	1,841.48	3,005.42	3,004.15	1.27	2,360.109		
200.00	200.00	175.00	175.00	0.49	2.66	142.21	-2,375.19	1,841.48	3,005.42	3,002.27	3.15	954.013		
300.00	300.00	275.00	275.00	0.85	4.18	142.21	-2,375.19	1,841.48	3,005.42	3,000.39	5.03	597.836		
400.00	400.00	375.00	375.00	1.21	6.64	142.21	-2,375.19	1,841.48	3,005.42	2,997.57	7.85	383.078		
500.00	500.00	475.00	475.00	1.57	9.67	142.21	-2,375.19	1,841.48	3,005.42	2,994.18	11.24	267.368		
600.00	599.98	574.98	574.98	1.93	12.71	162.81	-2,375.19	1,841.48	3,007.09	2,992.45	14.64	205.467		
700.00	699.84	674.84	674.84	2.29	15.74	162.81	-2,375.19	1,841.48	3,012.09	2,994.06	18.03	167.074		
800.00	799.45	774.45	774.45	2.65	18.77	162.81	-2,375.19	1,841.48	3,020.42	2,999.00	21.42	141.037		
900.00	898.70	873.70	873.70	3.02	21.78	162.81	-2,375.19	1,841.48	3,032.07	3,007.27	24.79	122.293		
1,000.00	997.47	972.47	972.47	3.40	24.78	162.81	-2,375.19	1,841.48	3,047.03	3,018.87	28.16	108.208		
1,100.00	1,095.62	1,070.62	1,070.62	3.79	27.76	162.80	-2,375.19	1,841.48	3,065.28	3,033.77	31.51	97.283		
1,200.00	1,193.12	1,168.12	1,168.12	4.21	30.72	162.85	-2,375.19	1,841.48	3,086.55	3,051.71	34.84	88.585		
1,300.00	1,290.48	1,265.48	1,265.48	4.64	33.68	162.97	-2,375.19	1,841.48	3,108.42	3,070.25	38.17	81.443		
1,400.00	1,387.84	1,362.84	1,362.84	5.08	36.63	163.09	-2,375.19	1,841.48	3,130.29	3,088.80	41.49	75.439		
1,500.00	1,485.20	1,460.22	1,460.20	5.52	39.59	163.21	-2,375.19	1,841.48	3,152.18	3,107.36	44.83	70.322		
1,600.00	1,582.57	1,557.58	1,557.57	5.97	42.55	163.33	-2,375.19	1,841.48	3,174.09	3,125.93	48.16	65.910		
1,700.00	1,679.93	1,654.94	1,654.93	6.43	45.51	163.45	-2,375.19	1,841.48	3,196.01	3,144.51	51.49	62.068		
1,800.00	1,777.29	1,752.30	1,752.29	6.88	48.46	163.57	-2,375.19	1,841.48	3,217.94	3,163.11	54.83	58.692		
1,900.00	1,874.65	1,849.66	1,849.65	7.34	51.42	163.68	-2,375.19	1,841.48	3,239.88	3,181.71	58.16	55.702		
2,000.00	1,972.01	1,947.02	1,947.01	7.80	54.38	163.79	-2,375.19	1,841.48	3,261.83	3,200.33	61.50	53.036		
2,100.00	2,069.37	2,044.38	2,044.37	8.27	57.33	163.90	-2,375.19	1,841.48	3,283.80	3,218.96	64.84	50.644		
2,200.00	2,166.73	2,141.74	2,141.73	8.73	60.29	164.01	-2,375.19	1,841.48	3,305.77	3,237.59	68.18	48.486		
2,300.00	2,264.09	2,239.11	2,239.09	9.20	63.24	164.12	-2,375.19	1,841.48	3,327.76	3,256.24	71.52	46.530		
2,400.00	2,361.45	2,336.47	2,336.45	9.67	66.20	164.23	-2,375.19	1,841.48	3,349.76	3,274.90	74.86	44.747		
2,500.00	2,458.81	2,433.83	2,433.81	10.14	69.16	164.33	-2,375.19	1,841.48	3,371.77	3,293.57	78.20	43.117		
2,600.00	2,556.17	2,531.19	2,531.17	10.61	72.11	164.44	-2,375.19	1,841.48	3,393.79	3,312.25	81.54	41.621		
2,700.00	2,653.53	2,628.55	2,628.52	11.08	75.03	164.55	-2,375.19	1,841.48	3,415.84	3,330.70	85.14	40.119		
2,800.00	2,750.90	2,725.92	2,725.90	11.55	78.03	164.64	-2,375.19	1,841.48	3,437.87	3,349.64	88.22	38.967		
2,900.00	2,848.26	2,823.28	2,823.26	12.02	80.99	164.74	-2,375.19	1,841.48	3,459.92	3,368.36	91.57	37.786		
3,000.00	2,945.62	2,920.64	2,920.62	12.49	83.94	164.84	-2,375.19	1,841.48	3,481.98	3,387.08	94.91	36.688		
3,100.00	3,042.98	3,018.00	3,017.98	12.96	86.90	164.94	-2,375.19	1,841.48	3,504.06	3,405.81	98.25	35.665		
3,200.00	3,140.34	3,115.36	3,115.34	13.43	89.86	165.03	-2,375.19	1,841.48	3,526.14	3,424.55	101.59	34.709		
3,300.00	3,237.70	3,212.72	3,212.70	13.91	92.81	165.13	-2,375.19	1,841.48	3,548.23	3,443.30	104.93	33.815		
3,400.00	3,335.06	3,310.08	3,310.06	14.38	95.77	165.22	-2,375.19	1,841.48	3,570.33	3,462.05	108.27	32.975		
3,500.00	3,432.42	3,407.44	3,407.42	14.85	98.73	165.31	-2,375.19	1,841.48	3,592.44	3,480.82	111.62	32.186		
3,600.00	3,529.78	3,504.80	3,504.78	15.33	101.68	165.41	-2,375.19	1,841.48	3,614.56	3,499.60	114.96	31.443		
3,700.00	3,627.14	3,602.16	3,602.14	15.80	104.64	165.50	-2,375.19	1,841.48	3,636.68	3,518.38	118.30	30.741		
3,800.00	3,724.50	3,699.52	3,699.50	16.28	107.60	165.58	-2,375.19	1,841.48	3,658.82	3,537.18	121.64	30.079		
3,900.00	3,821.87	3,796.88	3,796.87	16.75	110.55	165.67	-2,375.19	1,841.48	3,680.96	3,555.98	124.98	29.452		
4,000.00	3,919.23	3,894.25	3,894.23	17.23	113.51	165.76	-2,375.19	1,841.48	3,703.11	3,574.79	128.33	28.857		
4,100.00	4,016.59	3,991.61	3,991.59	17.70	116.47	165.85	-2,375.19	1,841.48	3,725.27	3,593.61	131.67	28.293		
4,200.00	4,113.95	4,088.97	4,088.95	18.18	119.42	165.93	-2,375.19	1,841.48	3,747.44	3,612.43	135.01	27.757		
4,300.00	4,211.31	4,186.33	4,186.31	18.65	122.38	166.02	-2,375.19	1,841.48	3,769.62	3,631.27	138.35	27.247		
4,400.00	4,308.67	4,283.69	4,283.67	19.12	125.34	166.14	-2,375.19	1,841.48	3,791.77	3,649.87	141.69	26.759		
4,500.00	4,406.03	4,381.05	4,381.03	19.57	128.31	166.30	-2,375.19	1,841.48	3,810.85	3,665.80	145.05	26.273		
4,600.00	4,503.40	4,478.42	4,478.40	19.98	131.39	166.44	-2,375.19	1,841.48	3,825.13	3,676.64	148.49	25.760		
4,700.00	4,600.76	4,575.78	4,575.76	20.33	134.31	166.58	-2,375.19	1,841.48	3,839.88	3,687.92	151.77	25.240		
4,800.00	4,698.12	4,673.14	4,673.12	20.61	137.24	166.71	-2,375.19	1,841.48	3,854.11	3,699.11	155.04	24.887		
4,900.00	4,795.48	4,770.50	4,770.48	20.85	140.06	166.85	-2,375.19	1,841.48	3,868.33	3,710.29	158.20	24.419		
5,000.00	4,892.84	4,867.86	4,867.84	21.04	142.73	166.97	-2,375.19	1,841.48	3,882.55	3,721.47	161.20	23.945		

CC - Min centre to center distance or covergent point, SF - min separation factor, ES - min ellipse separation



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 2H - Slot 2H
Project:	San Juan, NM NAD83	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Reference Site:	Heros 2308-09L	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Heros 2308-09L 2H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #6	Offset TVD Reference:	Offset Datum

Offset Design Heros 2308-09L - State NM 16 #21 Unit C - OH - OH														Offset Site Error:	0.00 usft
Survey Program: 313-INCLINOMETER														Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Highside Toolface (°)	Offset Wellbore Centre		Distance		Minimum Separation (usft)	Separation Factor	Warning		
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)		+N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)					
5,100.00	4,962.35	4,937.64	4,937.35	21.20	145.19	66.48	-2,375.19	1,841.48	3,768.00	3,603.95	164.04	22.969			
5,200.00	5,035.49	5,010.78	5,010.49	21.33	147.42	67.64	-2,375.19	1,841.48	3,733.73	3,567.00	166.73	22.394			
5,300.00	5,099.34	5,074.63	5,074.34	21.44	149.35	69.93	-2,375.19	1,841.48	3,693.64	3,524.37	169.26	21.822			
5,400.00	5,152.81	5,128.10	5,127.81	21.60	150.98	73.17	-2,375.19	1,841.48	3,648.76	3,477.08	171.68	21.253			
5,500.00	5,194.93	5,170.21	5,169.93	22.28	152.26	77.25	-2,375.19	1,841.48	3,600.53	3,426.54	173.99	20.694			
5,600.00	5,224.94	5,200.23	5,199.94	23.69	153.17	81.67	-2,375.19	1,841.48	3,550.24	3,374.05	176.19	20.150			
5,700.00	5,242.33	5,217.62	5,217.33	25.43	153.70	86.21	-2,375.19	1,841.48	3,499.00	3,320.74	178.27	19.628			
5,800.00	5,250.03	5,225.31	5,225.03	27.39	153.93	87.65	-2,375.19	1,841.48	3,448.23	3,267.96	180.27	19.128			
5,900.00	5,257.14	5,232.43	5,232.14	29.52	154.15	87.79	-2,375.19	1,841.48	3,399.55	3,217.09	182.46	18.632			
6,000.00	5,262.01	5,237.29	5,237.01	31.79	154.29	89.95	-2,375.19	1,841.48	3,352.31	3,167.56	184.75	18.145			
6,100.00	5,262.17	5,237.45	5,237.17	34.16	154.30	89.95	-2,375.19	1,841.48	3,305.75	3,118.72	187.03	17.675			
6,200.00	5,262.33	5,237.61	5,237.33	36.62	154.30	89.96	-2,375.19	1,841.48	3,261.58	3,072.13	189.45	17.216			
6,300.00	5,262.49	5,237.78	5,237.49	39.15	154.31	89.96	-2,375.19	1,841.48	3,219.92	3,027.92	192.00	16.770			
6,400.00	5,262.65	5,237.94	5,237.65	41.75	154.31	89.96	-2,375.19	1,841.48	3,180.86	2,986.20	194.66	16.341			
6,500.00	5,262.81	5,238.10	5,237.81	44.40	154.32	89.97	-2,375.19	1,841.48	3,144.49	2,947.08	197.40	15.929			
6,600.00	5,262.97	5,238.26	5,237.97	47.09	154.32	89.97	-2,375.19	1,841.48	3,110.91	2,910.68	200.23	15.537			
6,700.00	5,263.13	5,238.42	5,238.13	49.82	154.33	89.97	-2,375.19	1,841.48	3,080.21	2,877.09	203.12	15.164			
6,800.00	5,263.29	5,238.58	5,238.29	52.57	154.33	89.97	-2,375.19	1,841.48	3,052.49	2,846.43	206.06	14.814			
6,900.00	5,263.45	5,238.74	5,238.45	55.36	154.34	89.98	-2,375.19	1,841.48	3,027.81	2,818.78	209.03	14.485			
7,000.00	5,263.61	5,238.90	5,238.61	58.16	154.34	89.98	-2,375.19	1,841.48	3,006.26	2,794.23	212.03	14.179			
7,100.00	5,263.77	5,239.06	5,238.77	60.99	154.35	89.98	-2,375.19	1,841.48	2,987.90	2,772.88	215.02	13.896			
7,200.00	5,263.94	5,239.22	5,238.94	63.83	154.35	89.99	-2,375.19	1,841.48	2,972.80	2,754.78	218.01	13.636			
7,300.00	5,264.10	5,239.38	5,239.10	66.69	154.36	89.99	-2,375.19	1,841.48	2,960.99	2,740.01	220.98	13.399			
7,400.00	5,264.26	5,239.54	5,239.26	69.56	154.36	89.99	-2,375.19	1,841.48	2,952.53	2,728.62	223.91	13.186			
7,500.00	5,264.42	5,239.70	5,239.42	72.44	154.37	90.00	-2,375.19	1,841.48	2,947.44	2,720.64	226.79	12.996			
7,600.00	5,264.58	5,239.87	5,239.58	75.33	154.37	90.00	-2,375.19	1,841.48	2,945.73	2,716.12	229.61	12.829			
7,600.21	5,264.58	5,239.87	5,239.58	75.33	154.37	90.00	-2,375.19	1,841.48	2,945.73	2,716.11	229.62	12.829 CC			
7,700.00	5,264.74	5,240.03	5,239.74	78.23	154.38	90.00	-2,375.19	1,841.48	2,947.42	2,715.06	232.36	12.685 ES			
7,800.00	5,264.90	5,240.19	5,239.90	81.13	154.38	90.01	-2,375.19	1,841.48	2,952.50	2,717.48	235.02	12.563			
7,900.00	5,265.06	5,240.35	5,240.06	84.05	154.39	90.01	-2,375.19	1,841.48	2,960.95	2,723.36	237.59	12.462			
8,000.00	5,265.22	5,240.51	5,240.22	86.97	154.39	90.01	-2,375.19	1,841.48	2,972.74	2,732.68	240.06	12.383			
8,100.00	5,265.38	5,240.67	5,240.38	89.90	154.40	90.02	-2,375.19	1,841.48	2,987.83	2,745.41	242.42	12.325			
8,200.00	5,265.54	5,240.83	5,240.54	92.83	154.40	90.02	-2,375.19	1,841.48	3,006.18	2,761.51	244.67	12.287			
8,300.00	5,265.70	5,240.99	5,240.70	95.76	154.41	90.02	-2,375.19	1,841.48	3,027.72	2,780.91	246.80	12.268 SF			
8,400.00	5,265.86	5,241.15	5,240.86	98.71	154.41	90.03	-2,375.19	1,841.48	3,052.38	2,803.57	248.81	12.268			
8,500.00	5,266.03	5,241.31	5,241.03	101.65	154.42	90.03	-2,375.19	1,841.48	3,080.09	2,829.39	250.70	12.286			
8,600.00	5,266.19	5,241.47	5,241.19	104.60	154.42	90.03	-2,375.19	1,841.48	3,110.78	2,858.31	252.47	12.322			
8,700.00	5,266.35	5,241.63	5,241.35	107.55	154.43	90.03	-2,375.19	1,841.48	3,144.34	2,890.23	254.11	12.374			
8,800.00	5,266.51	5,241.79	5,241.51	110.51	154.43	90.04	-2,375.19	1,841.48	3,180.70	2,925.06	255.64	12.442			
8,900.00	5,266.67	5,241.95	5,241.67	113.46	154.44	90.04	-2,375.19	1,841.48	3,219.75	2,962.70	257.05	12.526			
9,000.00	5,266.83	5,242.12	5,241.83	116.43	154.44	90.04	-2,375.19	1,841.48	3,261.41	3,003.06	258.35	12.624			
9,100.00	5,266.99	5,242.28	5,241.99	119.39	154.45	90.05	-2,375.19	1,841.48	3,305.56	3,046.02	259.54	12.736			
9,200.00	5,267.15	5,242.44	5,242.15	122.35	154.45	90.05	-2,375.19	1,841.48	3,352.12	3,091.49	260.62	12.862			
9,300.00	5,267.31	5,242.60	5,242.31	125.32	154.46	90.05	-2,375.19	1,841.48	3,400.98	3,139.37	261.61	13.000			
9,400.00	5,267.47	5,242.76	5,242.47	128.29	154.46	90.06	-2,375.19	1,841.48	3,452.04	3,189.54	262.50	13.150			
9,500.00	5,267.63	5,242.92	5,242.63	131.26	154.47	90.06	-2,375.19	1,841.48	3,505.22	3,241.91	263.31	13.312			
9,600.00	5,267.79	5,243.08	5,242.79	134.24	154.47	90.06	-2,375.19	1,841.48	3,560.41	3,296.38	264.03	13.485			
9,700.00	5,267.95	5,243.24	5,242.95	137.21	154.48	90.07	-2,375.19	1,841.48	3,617.52	3,352.85	264.67	13.668			
9,800.00	5,268.11	5,243.40	5,243.11	140.19	154.48	90.07	-2,375.19	1,841.48	3,676.47	3,411.23	265.24	13.861			
9,900.00	5,268.28	5,243.56	5,243.28	143.16	154.49	90.07	-2,375.19	1,841.48	3,737.16	3,471.42	265.75	14.063			

CC - Min centre to center distance or convergent point, SF - min separation factor, ES - min ellipse separation



Scientific Drilling, Intl
Anticollision Report



Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 2H - Slot 2H
Project:	San Juan, NM NAD83	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Reference Site:	Heros 2308-09L	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Heros 2308-09L 2H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #6	Offset TVD Reference:	Offset Datum

Offset Design Heros 2308-09L - State NM 16 #21 Unit C - OH - OH												Offset Site Error:	0.00 usft
Survey Program: 313-INCLINOMETER												Offset Well Error:	0.00 usft
Reference		Offset		Semi Major Axis		Distance							
Measured Depth (usft)	Vertical Depth (usft)	Measured Depth (usft)	Vertical Depth (usft)	Reference (usft)	Offset (usft)	Highside Toolface (")	Offset Wellbore Centre +N/-S (usft)	+E/-W (usft)	Between Centres (usft)	Between Ellipses (usft)	Minimum Separation (usft)	Separation Factor	Warning
10,000.00	5,268.44	5,243.72	5,243.44	146.14	154.49	90.08	-2,375.19	1,841.48	3,799.52	3,533.33	266.19	14.274	
10,100.00	5,268.60	5,243.88	5,243.60	149.12	154.49	90.08	-2,375.19	1,841.48	3,863.46	3,596.89	266.57	14.493	
10,200.00	5,268.76	5,244.04	5,243.76	152.10	154.50	90.08	-2,375.19	1,841.48	3,928.90	3,662.00	266.90	14.721	
10,300.00	5,268.92	5,244.21	5,243.92	155.09	154.50	90.08	-2,375.19	1,841.48	3,995.77	3,728.60	267.18	14.956	
10,350.70	5,269.00	5,244.29	5,244.00	156.60	154.51	90.09	-2,375.19	1,841.48	4,030.20	3,762.90	267.30	15.077	

Company:	Logos Operating LLC	Local Co-ordinate Reference:	Well Heros 2308-09L 2H - Slot 2H
Project:	San Juan, NM NAD83	TVD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Reference Site:	Heros 2308-09L	MD Reference:	GL 6913' & RKB 25' @ 6938.00usft (Aztec 1000)
Site Error:	0.00 usft	North Reference:	True
Reference Well:	Heros 2308-09L 2H	Survey Calculation Method:	Minimum Curvature
Well Error:	0.00 usft	Output errors are at	2.00 sigma
Reference Wellbore	OH	Database:	Grand Junction District
Reference Design:	Plan #6	Offset TVD Reference:	Offset Datum

Reference Depths are relative to GL 6913' & RKB 25' @ 6938.00usft (A)
Offset Depths are relative to Offset Datum
Central Meridian is -107.8333334

Coordinates are relative to: Heros 2308-09L 2H - Slot 2H
Coordinate System is US State Plane 1983, New Mexico Western Zone
Grid Convergence at Surface is: 0.08°

